(9275) G. B. writes: In an encyclopedia I find the statement that red, green, and blue are primary colors, and that they cannot be resolved into other colors nor produced by combining other colors. In discussing the subject a little further on, you state green is produced by combining yellow and blue, which is a contradiction of your first statement. I therefore take it that green can be resolved into yellow and blue; hence why do you say the primary colors cannot be resolved into others? A. We are not able to see the contradiction in the two statements that "red, green, and blue are primary colors" and that "green is produced by combining yellow and blue." Both are facts. Red, green, and blue are taken as primary color sensations by most modern writers, in accordance with the theory of the late Prof. Helmholtz, who was first in authority upon physiological optics. These colors satisfy most tests of a good working theory in this subject. There seems to be no better theory before the scientific world for acceptance. Until a better appears, it is not probable that this will be set aside. It is now found in almost every textbook of optics. An easy experiment may be performed with lights which illustrates the theory. Take three colored glasses or gelatines, a vermilion blue, an emerald green, and an ultramarine blue. Project these side by side on a screen, each by a separate lens, so arranged as to be movable; a circular form is perhaps more convenient for the experiment, and the projection may be so that the three circles are tangent to each other. Now move the lenses nearer together, so that the disks of colored light overlap. Do not have the disks themselves overlap, but the projections of the disks are to overlap. The red and the green light combine to form some shade of yellow, the green and blue form some shade intermediate between these shades, and the red and blue form some shade of purple. Where the three overlap you will have white, if the original colors were what are required by the proper spectrum tints. There are many other tints in sets of threes which will form white, but this set has been taken as on the whole the most satisfactory, and will for the present at least probably not be displaced. Now as to the statement that "green is produced by combining yellow and blue." Make one solution of potassium chromate, and another of copper sulphate, to which add ammonia till a rich deep blue color is obtained. Put these in vertical tanks or flat-sided bottles, and project as before. When the disks overlap, it is found that the combined disks give *white*. But if the light is allowed to pass through both solutions to the screens, the color on the screen is *green*. There is evidently something here to be studied. Test the two lights with a spectroscope or projecting prism. The yellow of the potassium chromate is found to transmit red, yellow, and green of the spectrum; the blue of the ammonio-sulphate of copper transmits green, blue and violet of the spectrum. Each absorbs what the other transmits with the exception of *green*, which is transmitted by both liquids. Green is the only portion of white light which can get through both liquids, and therefore a mixture of these colors always looks green. It is only in this sense that a combination of yellow and blue produces green, that is, by absorbing all other colors, green alone remains. If the yellow and blue lights are combined by mixture, not by absorption, *white* is produced. Both statements are facts. Each requires its proper interpretation.

(9276) S. H. asks: What is the relative increase of power as you near the focal end of a lever? To illustrate. Suppose the lever is 10 feet long and fulcrum is placed 24 inches from focal end, then to 18 inches and to 12 inches, what is the relative increase of power of the several positions as you approach the focal point? A. The mechanical efficiency of a lever is the ratio of the two arms, or distances from the fulcrum to the power and to the weight to be moved. If the lever is 10 feet long and the fulcrum is 2 feet from one end, the weight arm is 2 feet and the power arm is 8 feet. The weight is four times the power. If the weight arm is reduced to 1 foot, the power arm becomes 9 feet, and the weight will be nine times the power. In the same way the value of the lever in any case is determined. The ratio of the power to the weight is the same as that of the power arm to the weight arm.

(9277) S. S. W. asks: Will you inform me whether it is possible to raise the temperature of water any number of degrees by agitating it in a cylinder revolving at a rapid rate, if there are any impediments within the cylinder to break the water? If so, how high a temperature could be reached, and is it better to revolve the cylinder or a rod through the center to which the breaks are attached? A. It is not only possible to raise the temperature of water by agitating it, but this always occurs. The water at the foot of a fall is warmer than at the top, as has been proved at Niagara Falls. When the agitation takes place in a cylinder properly prepared for measurements, the amount of heat required to raise 1 pound one degree can be determined, and it is by this method that the work was done by Joule, upon which all steam engines are constructed. The heat unit is the quantity of heat required to raise one unit weight of water one degree, a unit in constant use in engineering. One pound of coal will produce on the average 14,000 to 15,000 heat units.

(9278) L. F. H. says: What is the method of piping now employed in the two-cycle engines in order to exhaust them under water? A. The action is somewhat similar to that which takes place in the steam engine. Exhausting a steam engine under water is a very bad plan to follow, not counterbalanced by any advantages. In striking water the steam is condensed and a vacuum is formed, the water immediately fills the exhaust pipe, and if the pipe is short, the cylinder also, unless there is a check valve in the exhaust pipe to prevent the water from flowing back. Moreover, there is a back pressure on the piston equal to the atmospheric pressure on the area of the exhaust pipe, which may or may not be 10 per cent of the power of the engine, according to the boiler pressure used. The method of piping depends upon the conditions present.

(9279) E. A. A. asks: 1. Is the energy in form of light in an inclosed furnace or under a steam boiler wasted? If not, how does it utilize itself? A. The light given out by burning coal is the same thing as its heat energy. Light and heat are the same thing, so far as energy is concerned. Both are classed as radiant energy in all the latest books of physics. The light is but an incident of an eye. If there were no eye the light would not appear. 2. How are the oil holes in the Morse twist drill made? A. We have no knowledge of the special process used in making the oil tubes in the twist drill you mention. You can address the inquiry to the company making the drill and they will doubtless give you the information. 3. How is the best magnet steel prepared and what hardness should it have to take and maintain the strongest magnetizing? A. Magnets are made of any high-grade steel. Jessup's and Stubbs' are very good. The ends of the magnet are glass-hardened, the rest remains soft. 4. Why does the resistance in an incandescent lamp filament increase with the age of it and why does the efficiency fall at the same time? A. The resistance of an incandescent lamp filament increases with use because the filament becomes smaller. The carbon is gradually driven off and flies against the bulb, making it black. As the resistance increases the current decreases, and if the lamp gets less current it cannot give as much light, since it is not heated so hot as at first.

(9280) G. W. B. says: 1. At what temperature will frost collect on glass if no moisture is in the air? A. Frost cannot collect on the windows when there is no moisture in the air at any temperature. Frost is the moisture of the air changed to ice. 2. At what temperature will it collect when there is a quantity of moisture in the air, such as is ordinarily? A. Water freezes at 32 deg. Fahr. and frost forms at the same temperature. 3. If temperature of a room is above freezing will frost collect on the windows? If so, at what temperature must the surrounding air be in order to keep glass warm enough to keep off frost and melt snow lighting on window? The idea is to keep the window transparent enough to clearly see through it. A. Frost may collect on windows when the air of the room is above freezing, since the glass is in contact with the outer air and is colder than the air in the room. The glass must be permanently above freezing to keep frost off and melt snow striking the windows. 4. What is the voltage and amperage of the ordinary circuit of lamps in a trolley car? A. If a voltage of 500 is used on a trolley car the lamps are usually of 100 volts each, and are placed in a series of five. 5. Is the current reduced by a transformer for this light circuit or taken directly from the main circuit? A. In the case above each lamp gets its requisite voltage and all are lighted directly from the trolley current without transformation. 6. Would the heat generated from an ordinary electric lamp as used in a trolley car be sufficient to melt a wax candle, if it were placed against the lamp? A. The heat from an ordinary incandescent lamp bulb is sufficient to melt wax candles and to set fire to paper or cloth left in contact with it for a long time. 7. Have you addresses of companies manufacturing condensers, as used with spark coils from ¼ inch up? A. You can obtain condensers from any dealer in electrical goods. Nearly every week we have advertisements of such in our columns. 8. Have you a Suppement giving information on making condensers? A. Supplement No. 1124, price 10 cents, gives the instructions necessary for making a condenser and a complete coil giving a spark of six inches. 9. Where can I buy or at what kind of place can I obtain tin-foil? A. Tin-foil can be bought from any electrical store.

(9281) A. N. says: What size wire must I use to magnetize a wire core for an induction coil, core being 7 inches by ⅞, No. 20? Annealed iron wire using 2 amperes, 20 volts? Also at 1½ amperes, 27 volts? Also at 1 ampere, 40 volts, or what would be the best current to use? I have a 40-watt dynamo which I am going to wind for it. What current would be best to wind it for, for use on coil? What is the carrying capacity of copper wire in armatures, that is, sizes from No. 16 B. & S. to No. 30 B. & S.? Also carrying capacity of wire in fields from No. 16 B. & S. to No. 30 B. & S.? Have you any Supplement giving the above carrying capacities? If so, what number? Is hard granular carbon, such as used in telephone transmitters, good for coherers in wireless telegraphy? Should it be a rather fine powder or coarse? What is the best coherer to make and use for experimental purposes? Is there any that don't need decoherers? If so, what? How big a spark should 1½-pound s. c. c. B. & S. No. 35 copper wire give? How far will 1½-inch coil work a coherer? What size spark is used to signal across the Atlantic? What current is used in primary? Can more than one induction be connected in series? If two 1½-inch coils are connected in series, would it give 3 inches, or how should they be connected? A. Induction coils are made for certain length of spark, not for certain voltage and amperes of current. Wind the coil for spark, and then put on the current. The primary is always wound in two layers of coarse wire from end to end of the spool, which is mounted on the core, leaving the wires of the core projecting somewhat from the heads of the spool. You should get a book of directions for coil making, and follow its instructions. You will then be able to secure the sort of coil you desire. We recommend Norrie's Induction Coils, price $1. One and a half pounds of No. 35 cotton-covered magnet wire may give as a secondary of a coil a spark of ¾ to 1 inch long. As to your questions regarding wireless telegraphy, very little is known about the apparatus used for sending signals across the Atlantic Ocean. Coherers are made with silver or nickel filings in fine powder. You will find in our paper several forms of coherers. We can send you six papers on wireless telegraphy, or a dozen for that matter, which will give much assistance in the making of an apparatus. Two coils of a half-inch spark cannot be connected so as to give a spark of double the length.

(9282) H. F. asks: We have an electric light plant in our little city, direct current, 220 volts, quoting us a price of 10 cents per thousand watts. How much will this quotation cost us to run a 4-horsepower motor per 24 hours, as the city has installed this plant, and their engineer cannot give us the figures in horse power? A. An electrical horse power is 746 watts. Four horse power would be 2,984 watts per hour, and for 24 hours would be 71,616 watts. This at 10 cents per 1,000 watts would cost $7.16.

(9283) E. S. B. asks the following questions: If in any of the past issues the following questions are explained, I would only be too glad to get those Scientific Americans; but if the Editor cannot refer me to a back number, I will look for the answers in the columns of Notes and Queries. Explanation of alternating current, two-phase and three-phase current, and two-phase three-wire system. What is meant by inertia, the moment of inertia, and the inertia of a flywheel? How is the flywheel for an ordinary steam engine calculated? How is the flywheel of an air compressor belt-driven calculated? How is a flywheel calculated for an air compressor, the air compressor being connected tandem fashion to a steam cylinder, the air compressor in one case being single-acting, and in another case double-acting? How is the flywheel of an ammonia compressor calculated, having twin horizontal steam cylinders and twin vertical ammonia cylinders, the cranks being set at 90 deg. to each other, and the cylinders being double-acting and in another case single-acting? How is the balancing weight in the main driving wheel of a locomotive calculated? A. Your college library must surely contain books giving the information you desire. Any work on electricity will define an alternating current; any book on physics will define inertia. Any teacher of physics in the college can help you, and a technical college surely is provided with apparatus for illustrating all these points. An alternating current is one which changes the direction of flow at regular intervals. A current of 60 alternations would change 60 times per second, and would have 30 cycles or complete changes from positive to negative and back again. "Phase" expresses the relation of the e. m. f. to the current. In a single-phase current the pressure rises from zero to a maximum, falls to zero and to a negative value equal to the maximum positive value, and rises to zero again in each cycle. This current serves a two-wire circuit with a single pressure. A direct current dynamo would give this current if the commutator were replaced by rings. A two-phase machine has connection made with the armature coils, so that two single-phase currents are taken from it at the same time for two different currents, but the time of greatest pressure in one is the time of zero pressure in the other. The phases are 180 deg. apart. A three-phase circuit has theoretically three circuits of two wires each, and the pressure on any one is 120 deg. from those on either side of it. You will find the whole matter fully explained in Sheldon's "Alternating Current Machines," which we can send you for $2.50 by mail. In a two-phase system four wires are required for the use of both phases separately. Inertia is the tendency of a body at rest to remain at rest, and of a body in motion to remain in uniform motion in a straight line, unless compelled to change by some external force. The moment of inertia is the force necessary to give a body a unit angular velocity in one second. It is calculated for bodies of regular forms by formulas which you may find in books of higher mechanics. A good simple presentation of the subject may be found in Stewart and Lee's "Practical Physics," Vol. I., which we can send you for $2.25. The moment of inertia of a flywheel is that of a ring, very nearly, since the arms are usually very light as compared with the rim. The formula for this is $I = \frac{R^2\ r^2}{2} \times M$, in which M is the weight, R the radius of the outside of the rim, and r the radius of the inside of the rim. See Scientific American Supplement No. 891 on centrifugal force as applied to revolving machinery, flywheels, etc., price 10 cents mailed. Thurston gives for automatic engines the formula $250{,}000 \frac{A S p}{R^2 D^2}$ = the weight of flywheel, in which A is the area of the piston in square inches, S = stroke in feet, p = mean steam pressure in pounds per square inch, R = revolutions per minute, D = outside diameter of wheel in feet. This formula is also applicable to belt-driven air compressors, and to the differential conditions of the steam and air cards of a steam-driven air compressor. In any form of compressors for air or ammonia, the compensating conditions of crank angle and opposite pressures must be considered and balanced in the complicated problem of flywheel weight and size. The balancing of the driving wheels of locomotives is somewhat complex, depending upon their reciprocating weights in the longitudinal and vertical direction. The subject of flywheel weights and sizes and counterbalancing locomotives is fully discussed in Kent's "Mechanical Engineer's Pocket Book," $5 by mail.

(9284) L. F. B. asks: Is there any reason why the —— and also the —— dry batteries, which are good, strong cells for automobile work, cannot be made more durable? The cell as it is now made is soldered. The joint of course starts small independent action, and that starts leaking and vaporization of the contents by the joint giving way. I have found this so almost invariably. It seems to me that a *zinc cell* could be made of seamless tubing, thus avoiding a soldered *joint* or *lap*. Better still, the whole cell could very easily be stamped or pressed out in one piece, as the common cartridge cell is pressed out. Is there any reason why this change in making would not be vastly superior, and also make the life of the battery considerably longer. The manufacturers would also save in cost of manufacture. A. The strong competition between the makers of cells has reduced the prices, but also unfortunately reduced the quality also. A good and durable dry cell is very much to be desired. Your suggestions seem to be of value.

(9285) W. S. says: How can I chemically treat Canton flannel and cotton draperies to make them non-inflammable? A. A composition, to be used for theatrical scenery (or the mounted but unpainted canvas to be used for this purpose), and also for woodwork, furniture, door and window frames, etc., is to be applied hot with a brush like ordinary paint. It is composed of boracic acid, 5 pounds; hydrochlorate of ammonia or sal-ammoniac, 15 pounds; potash feldspar, 5 pounds; gelatine, 1.5 pounds; size, 50 pounds; water, 100 pounds; to which is added a sufficient quantity of a suitable calcareous substance to give the composition sufficient body or consistency.

NEW BOOKS, ETC.

The Tenement House Problem. Edited by Robert W. DeForest and Lawrence Veiller. New York: The Macmillan Company. 1903. Two volumes. 8vo. Pp. 470, 516. Price $6.

This book is published as a contribution to the cause of municipal reform. It embodies the result of the investigations made in connection with the work of the New York State Tenement House Commission, appointed by President Roosevelt when he was Governor of the State of New York in 1900. It also includes the Tenement House Law as amended, and an introduction bringing down the history of tenement reform in New York to 1903. The work is filled with illustrations showing typical conditions in American cities, and it must be said that the volumes are put down with a sense of sadness that such awful conditions can obtain in a civilized city. There is, however, the brighter side to the subject, as the second volume in particular shows what is being done to ameliorate the very terrible conditions which exist in New York city.

Radiant Energy and its Analysis. Its Relation to Modern Astrophysics. By Edgar L. Larkin, Director of the Lowe Observatory, California. Los Angeles: Baumgardt Publishing Company. 1903. 12mo. Pp. 334.

The information presented in this book originally appeared in the form of a series of articles on radiant energy and its analysis in the San Francisco Examiner. Starting with an introductory chapter on radiant energy and on wave motion, Prof. Larkin passes to spectrum analysis and the spectroscope, showing just how important to the modern scientist the spectroscope has become. A chapter on Fraunhofer's work explains the discovery of Fraunhofer lines and their importance in the solar spectrum. Indeed, the most important chapters of this book are devoted to spectrum analysis, for very good reasons, too, in a popular book of this kind. Solar spots are discussed in a short chapter. Solar protuberances have also their place. The moot question of the terrestrial influences of sunspots is briefly reviewed, and likewise the relation between auroras and solar disturbances. The chapters on the sun discuss the amount of energy which the center of the solar system constantly emanates, as well as its influence upon terrestrial life. In the articles on the stellar universe in general, Prof. Larkin shows what modern astronomers have succeeded in doing with high-power instruments.

HOW TO MEASURE UP WOODWORK FOR BUILDINGS. By Owen B. Maginnis. New York: Industrial Publication Company. 1903. 18mo. Pp. 79. Price 50 cents.

This little work describes the simplest and most accurate methods to be followed when figuring all the woodwork required for either brick or frame houses. The author is a thoroughly practical man, being an inspector of buildings in the city of New York, and is a well-known writer on building construction. The little volume is an excellent one, and one which we can commend to all architects, contractors, and carpenters.

LOCOMOTIVE BREAKDOWNS, EMERGENCIES AND THEIR REMEDIES. By George L. Fowler, M. E. New York: Norman W. Henly Publishing Company. 1903. 12mo. Pp. 244. Price, $1.50.

The author is well known from his work on air brakes. The subject is dealt with in a peculiarly lucid manner, and nearly all the ills that locomotives are heir to are dwelt upon in a thoroughly common-sense manner. The popular question and answer system is used, this system serving to keep the writer to his point. Engineers and firemen, and those who aspire to be, will find the book full of good material.

UP-TO-DATE AIR-BRAKE CATECHISM. By Robert H. Blackall. New York: Norman W. Henley & Co. 1903. 12mo. Pp. 305. Two large folding charts. Price, $2.

The eighteenth revised edition is before us, and we must admit that it is a thoroughly adequate treatise on one of the most important subjects in the railway world. Practice is so constantly changing, that a book on the subject a few years old is obsolete. The popular question and answer system is retained. The diagrams and folding diagrams are excellent, while the colored charts are the most elaborate we have seen, and show both passenger and freight equipment. We commend the book most cordially to all interested.

WIRELESS TELEGRAPHY, ITS ORIGINS, DEVELOPMENT, INVENTIONS AND APPARATUS. By Charles Henry Sewell. New York: D. Van Nostrand Company. 1903. 12mo. Pp. 229. Price $2 net.

The aim of this book is to present a comprehensive view of wireless telegraphy, its history, principles, systems, and possibilities in theory and practice. It will prove of use both to the student and the general public. The art is in an imperfect state, and any literature which will tend to dissipate the general ignorance and misconception will be welcomed.

ONE HERTZIANE E TELEGRAFO SENZA FILI. By Dott Oreste Murani. Milan: U. Hoepli. 1903. 18mo. Pp. 341. Price, 75 cents.

The excellent little compends called "Manuali Hoepli" are eight hundred in number, and are an extraordinary monument to the ability of the publisher. All works on wireless telegraphy are popular at the present time, and it is to be hoped that this excellent book will soon be translated.

POOR'S MANUAL OF THE RAILROADS OF THE UNITED STATES. Thirty-sixth Annual Number. New York: Poor's Railroad Manual Company. 1903. 8vo. Pp. 1720. Price $10.

This work is probably among the most useful ever published for investors, and to the railroad official it is indispensable. It deals with the history, mileage lines of road operated, track mileage, water lines, proprietary railroads, capitalization of systems, interests in other railroad systems, rolling stock, profit and loss account, and various other statistics. Poor's Manual has long been a recognized authority upon the subjects which it treats. The length of railroads completed on December 31, 1902, was 203,131 miles; the net increase of all railroads in the United States in the calendar year 1902 was 3,447 miles. The total mileage of track is 274,835 miles. There are 41,626 locomotives, 27,364 passenger cars, 9,726 baggage and mail cars, and 1,503,949 freight cars.

EXPERIMENTAL RESEARCHES ON REINFORCED CONCRETE. By Armand Considère. Translated and arranged by Leon S. Moisseiff, C.E. New York. 1903. 8vo. Pp. 188. Price $2.00.

We have already had the privilege of reviewing the French edition of the author's work. The highly useful nature of concrete to the engineer is being felt more and more. The older books on concrete did not deal with reinforcing, which was largely brought into use by French and German engineers. The importance of the new material has become such that no civil engineer can well afford to be without a thorough knowledge of its properties, and this knowledge can be gained from this book.

ROOF FRAMING MADE EASY. By Owen B. Maginnis. New York: The Industrial Publication Company. 1903. 12mo. Pp. 164. Price $1.00.

The carpenter or builder who will study the methods described in this book will realize the constructive value of every piece of timber which enters into a framed roof and will understand how to lay out every piece of timber used without wasting valuable time and material on cutting and trying.

The language used is that of the practical workman; scientific phrases and confusing terms have been avoided where possible; and everything has been made so plain that any one who will faithfully study the book will understand it from beginning to end. In fact, every problem in the book was "tried" on a boy who had no experience in building work, and he understood every problem with a little study. This will show that the book is valuable to the beginner as well as the advanced workman.

HANDY LUMBER TABLES. Containing Board Measure, Plank Measure, Scantlings, Reduced to Board Measure, With Other Useful Data and Memoranda. New York: The Industrial Publication Company. 1903. 18mo. Pp. 24. Price 10 cents.

INDEX OF INVENTIONS

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AND EACH BEARING THAT DATE

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

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Adding machine automatic attachment, H. Marshall 748,766
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Air and gas mixing and delivering apparatus, Brown & Truckses 748,840
Air brake, emergency, W. H. Honsberger 748,733
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Air into its constituents oxygen and nitrogen, mechanism for separating liquid, H. Dumars 749,040
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Clock case, Woodruff & McCabe 748,679
Clothes line fastener, H. Kleinfeldt 748,622
Clutch, friction, A. R. Anderson 748,569
Cob pipe filler, J. H. Chapman 748,582
Cock and faucet mantle guard, P. F. Glazier 748,720
Coffee urn, F. Acker 748,910
Coin, automatic apparatus for delivering articles in exchange for, R. W. Vining 749,003
Coin sorter, C. S. Batdorf 748,836
Coins, machine for operating upon, J. E. Doldt 748,934
Coke drawing machine, J. A. Hebb 749,058
Color blending wheel, C. Scott 748,661
Concentrator, L. R. Tulloch 748,819
Concentrator, L. F. Schoenefeldt 749,104
Contact shoe, W. F. Taylor, Jr 748,813
Conveyor, pan, J. M. Dodge 749,038
Conveyor, pivoted bucket, E. Bivert 748,576
Conveyors, etc., tripper for bucket, E. Bivert 748,577
Cope, W. Leahy 749,069
Copper ores, treating, A. M. G. Sebillot 748,662
Corn ears, machine for picking, W. C. Sabin 748,656
Corn shocker, T. L. Creath 748,932
Corset spring, C. D. Wood 748,830
Cotton gin, Von Oven & Boesch 748,780
Creaming can, F. G. Fortney 748,598
Cultivator, weeder, and furrow maker, combined, T. J. Hubbell 748,737
Currycomb, D. M. Friedt 749,052
Currycomb, T. A. Howes 749,064
Cuspidor, C. E. Bertels 749,019
Designs, ornamentations, or letters on articles, material for producing, R. K. Duncan 748,851
Developing and fixing device, pocket, R. R. Lutz 748,964
Diaphragm indicating, controlling, and measuring appliance, Grouvelle & Arquembourg 748,944
Dish washing machine, J. H. Griswold 748,859
Disinfectant receptacle, W. L. McDonald 748,636
Display truck, couch, H. J. Montgomery 748,770
Distance or range finding instrument, T. Adamson 748,567
Door closer and check, E. Cliff 748,929
Door gage, D. Millspaugh 748,873
Door opening and closing device, mechanical, W. F. & J. Drieschman 748,848
Door operating mechanism, L. A. Shepard. 749,108
Door or window trimming, F. C. Walbridge 749,118
Door support, adjustable sliding, T. C. Prouty 748,787
Dough or like plastic materials, apparatus for dividing and compressing or molding, J. Callow 749,023
Draft equalizer, J. B. Hayden 748,730
Draft evener, F. Rosenow 749,100
Drafting appliance, garment, J. Robberts 748,792
Dredging machine, Smyth & Bowers 748,804
Drying moist material, apparatus for, E. N. Trump 748,893
Dumping apparatus, C. G. Foote 749,139
Duplicate engine, J. W. Neil 748,975
Dynamo or motor with alternating field, electric, R. Ziegenberg 748,907
Ear, C. E. Carll 748,581
Electric arcs for heating and lighting, apparatus for producing, J. I. Ayer 748,574
Electric circuit closer and breaker, T. H. McQuown 748,638
Electric coupling, G. A. Le Fevre 748,961
Electric motor switches, automatic brake for controlling, Muschenheim & Hendry 748,635
Electric signal, B. H. Scott 749,105
Electrical cut out, C. B. McPherson 749,085
Electrodes for storage batteries, producing, F. A. Feldkamp 748,940
Electrolier, adjustable, G. Andersen 749,138
Elevator boots, device for relieving choke in, I. Lutz 749,071
Elevator fender, H. L. Conary 748,702
Embroidering machine, Escuder & Forest 749,044
End gate, J. M. Groff 748,860
Engine. See Duplicate engine.
Engine feed regulator, gasoline, H. H. & C. B. Segner 748,990
Engine reverse motion, steam, F. Meanley 748,629
Engine wheel, traction, H. F. Krueger 749,068
Engines, fuel feed device for gasoline or vapor, E. Prouty 748,883
Engines, gas generating and feeding mechanism for gas, C. K. MacFadden 748,763
Envelop or card delivering cabinet, T. A. Matthews 748,966
Envelop, safety, J. F. Young 749,010
Ether, manufacturing, O. Meyer 748,078
Exhibiting mechanism, animal, W. D. Carson 748,700
Fabric cutting machine, H. Faltermayer 748,853
Fabric marking machine, M. J. Fisher 748,854
Fastening device, barbed, R. W. Meily 749,077
Fat cutter, C. Burnett 748,841
Feed trough, J. J. Smith 748,802
Feed trough attachment, T. L. Peacock 748,647
Fence post, G. W. Todd 748,817
Fence post, H. Hansberger 748,946
Fence post, J. K. Harris 749,056
Fence structure, S. L. Bailey 749,015
Fence, wire, S. S. Withington 749,137
Fertilizer distributor and cotton planter, I. C. Clyburn 748,843
File, combination credit, W. D. Mitchell 748,631
File, paper, C. C. Boykin 749,021
Filter, R. J. Goade 748,857
Filter press, E. B. Hack 749,140
Finger nail clipper, H. C. Hart 748,864
Firearm, C. J. Hamilton 748,723
Fish catcher, H. C. Reichardt 748,884
Fish nets, means for facilitating casting and drawing, L. Einarson 748,710
Fish trap, D. B. Roberts 748,654
Floor drain and backwater trap, combined, F. C. Edelen 748,936
Floors, paneling, etc., fastening means for parquet, W. S. Kelsey 748,746
Fodder fork, W. Giles 748,601
Folding or collapsible box of cardboard, etc., A. R. Buckton 749,125
Folding table, H. Johnson 748,956
Food cutter, C. J. Shirreff 748,665
Furnace, C. J. Andrus 748,833
Furniture tip, L. C. Matlack 748,965
Fuse, electric circuit, T. Nagel 748,639
Game apparatus, J. J. Wyly 748,680
Game apparatus, H. Ramme 748,788
Game board, L. J. Magie 748,626
Garment fastener, J. C. Christensen 749,026
Gas, apparatus for the manufacture of, R. Dempster 748,933
Gas burner, A. E. Howard 748,607
Gas engine, W. R. Kahlenberg 748,615
Gas, generating, F. H. Bates 748,687
Gas generator, H. W. Webb 749,006
Gas generator, acetylene, W. D. Packard 748,781
Gas generator, acetylene, H. W. Webb 749,007
Gate, J. Meyer 748,769
Gate automatic attachment, J. H. Jones 748,614
Gear, variable speed and reversing, H. C. Sheppard 748,799
Gear wheel, F. A. Richter 748,653
Gelatinous product and producing same, insoluble, H. V. Dunham 748,708
Generator. See Gas generator.
Glassware, etc., ornamented or lettered, R. K. Duncan 748,849
Glue from hides, making, E. R. Hewitt 748,866
Go cart, F. E. Southard 748,994
Go cart, or child's chair, J. Weber, Jr 749,119
Golf ball, etc., C. J. Grist 749,053
Governor and speed gear mechanism, combined, N. V. Johnson 748,958
Governor, engine, E. Hudson 748,738
Governor regulator, C. J. Koch 748,751
Grading machine, B. A. Karr 748,616
Grain binder, C. Colahan 748,587
Grain drill, H. Funk 748,717
Grain shoe, self-adjusting, J. T. Jardine 748,741
Grinder, twist drill, A. H. Reimann 748,651
Grinding machines, apparatus for feeding abrasive materials to, I. Flexner 748,855
Hand press, J. F. Helmold 748,947
Harness, Haller & Baker 749,054
Harrow, H. A. Brixen 748,837
Harvester, J. C. Parker 748,782
Harvester binder tension device, J. F. Harnish 749,055
Hat, sportsman's convertible, E. E. Hodshon 748,949, 748,950
Hay knife, W. S. Shippy 748,991
Heater, C. R. Bannihr 748,835
Heating apparatus, J. C. Nace 749,086
Heating system, electrical, E. H. Kitfield 748,749
Heddle, W. Fehr 748,713
Hinge, gate, J. H. Vandever 748,670
Holdback, breeching strap, T. Nichols 748,976
Horse head controller, B. W. Kindig, Jr 748,747
Horse shoe nails, machinery for the manufacture of, J. M. Laughlin 749,135
Hose coupling, J. Jeffrey 748,742
Hose, manufacturing, Shepard & Fish 748,798
Hot water and steam, apparatus for supplying, J. F. Connell 748,845
Hub attaching device, S. S. Thomas 748,892
Hydrocarbon burner, C. A. Hammel 748,862
Hydrocarbon burner, J. A. Walkley 748,897
Hydrometer, H. E. Broestler 748,838
Hydroxids and oxids of metals by electrolysis, production of, F. F. Hunt 748,609
Illuminating body, M. Korff 748,753
Ingots or like pieces under the hammer, machine for handling, G. P. Toy 749,049
Ink well, S. G. Reynolds 749,098
Internal combustion engine, E. Korting 748,959
Invalid sling, P. W. Atkinson 749,014
Jar closure, C. H. Nicholson 748,642
Jars, etc., packing for fruit, G. D. C. Coddington 748,586
Jars, etc., stoppering device for preserve, H. Martini 749,074
Knitting machine, circular, H. A. Houseman 749,062
Lacing, P. J. Congdon 748,703
Ladder, extension, M. J. Lewis 749,070
Lamp burner attachment, Stockman & Friel 748,889
Lamp burner, central draft, J. Gregory 749,132
Lamp, electric arc, Wirtz & Hamilton-Adams 748,904
Lamp, electric arc, E. H. Belden 748,915, 749,016 to 749,018
Lamp extinguisher, H. D. Hinks 749,061
Lamp hanger, extension, F. H. Geisler 748,718
Lamp, miner's safety, Moore & Sage 748,632
Lamp socket, incandescent electric, H. A. Framburg 748,599
Lamps, magnetic lock for miners' safety, A. Wiedenfeld 749,123
Latch, door, Quick & Smith 749,094
Laundry, portable, W. A. Roberson 748,986
Leg fastening, A. Ow 748,877
Lifting jack, M. M. Moore, Sr 748,972
Lifting jack, W. C. Smith 748,992
Liquid meter, Drisko & Berrenberg 748,707
Liquid mixing and spraying apparatus, W. H. Millspaugh 748,971
Liquors, clarifying, E. R. Hewitt 748,865
Load retaining stakes, position governing means for, W. M. Cain 748,698, 748,699
Lock. See Window lock.
Lock, E. Muhlinghaus 748,772
Locomotive signaling apparatus, H. Stadelmann, Jr 749,111
Loom shuttle and quill, narrow ware, E. H. Sawyer 748,887
Malt turner and aerator, J. Mueller 748,875
Marker, stock, L. J. Davis 749,035
Marking and cutting device, C. C. Stange 748,997
Marking tool, cattle, H. A. Jones 748,613
Marlinespike, H. Fesenfeld 748,714
Match safe, J. R. Thomas 748,891
Match safe and lighter, C. F. A. Cammann 748,925
Measure, liquid, H. J. & J. C. Brantley 748,694
Measures and funnels, automatic valve for combined, E. D. Schafer 748,988
Measuring tank, liquid, E. O. Linton 748,761
Megaphone, C. Melville 748,969
Metal beating machine, F. W. Grempler 748,722
Metal boring tool, Taylor & Newbold 748,890
Metallic formed sheet, Murphy & Camp 748,634
Meter registering mechanism, L. H. Nash 748,778
Milk can, W. J. Snow 748,805
Mining hoist safety appliance, J. Lewis 748,962
Mold, J. F. Spencer 748,996
Monkey wrench, N. D. Fairchild 748,938
Motion transmitter, V. J. Dolechek 749,039
Motor sparking plug, J. S. Foley 749,045
Music turner, sheet, J. W. Collier 749,028
Musical instrument self-playing attachment, J. Courville, reissue 12,189
Musical instrument tracker bar, J. T. Sibley 748,801
Noodles, etc., machine for cutting, C. Hurt. 748,952
Nozzle, J. Hueni 748,608
Nut lock, S. C. Crow 748,588
Nut lock, A. C. Fletcher 748,942
Nut, lock, Peters & Bellamy 748,882
Oil supply system, H. C. Hanson 748,727
Optometrist's trial frame, C. L. Hogue 748,732
Ornamented or lettered articles, manufacturing, R. K. Duncan 748,850
Oxalates, making, Rieche & Saame 748,791
Pad hook, O. H. Muntz 748,773
Paper from old newspapers, books, magazines, etc., making, Meixell & Holt 748,968
Paper handling machinery, sheet calipering device for, Dexter & Hallstream 749,037
Paper machine, H. A. Moses 748,973
Paper making machinery, H. Parker 748,645
Paper sheets, device for holding or binding loose or removable, R. G. Whitlock 749,122
Paper tube making machine, C. Frerot 749,051
Pasteboard making machine, P. Priem 748,983
Pencil sharpener, H. L. Adams 749,011
Penholder, C. J. Dahlgren 748,589
Pessary, F. L. Priest 748,650
Pianos, action for mechanical playing attachments for, G. S. Williams 748,828
Pick, mining, G. T. White 748,901
Pile point, R. S. Davis 748,705
Pin hook, G. W. McGill 749,084
Pipe bending machine, H. F. Condon 749,029
Pipe elbow machine, J. Baeumle 748,686
Pipe joint, lead, G. Bryar 748,579
Pipe joint or coupling, A. Spratt .. 748,807, 748,808
Piston joint, G. C. E. de Bonnechose 748,916
Planter marker lifter, corn, Harter & Doak 748,728
Plow attachment, E. H. Allman 748,682
Plow, disk, O. E. Ellison 749,043
Plow, ditching, J. S. McCants 749,082
Plow or cultivator, W. B. McKinley 748,774
Plow, reversible, H. E. Kreuter 748,623
Plow, sod cutting, J. F. Weber 748,675
Post. See Fence post.
Printing book backs, machine for, Northcott & Flora 748,643
Printing device mechanical movement, O. Tyberg 749,000
Printing machine, J. H. Reinhardt 748,886
Printing machine rollers, machine for cleaning, E. T. Cleathero 748,583
Printing machine, stencil, W. D. Sternberg 749,113
Printing press, C. H. Johnson 748,743
Printing press, automatic controlling mechanism, Dexter & Hailstream 749,036
Printing presses, metal holding apparatus for flatbed lithographic, W. J. Leyer 748,871
Printing surfaces, mechanism for preparing, B. A. Brooks 748,578
Pulley covering, J. F. Webb 748,674
Pump, air, G. W. Kellogg 748,617
Pump, duplex, P. F. Oddie 749,089
Pump or vacuum chamber, automatic suction, C. H. Wettlin 749,121
Pumping engine, De Laval & Aborn 748,758
Punching and shearing machine, etc., R. Norrie 748,979
Quartz mill, C. J. Hodge 748,867
Rail and conductor point operating mechanism, C. G. Goord 748,721
Rail cover, third, H. F. Duffy 748,591
Rail joint, A. L. Vinyard 748,672
Rail joint for tracks and especially for field railways, W. Weiss 748,826
Rail protector, third, H. F. Duffy 748,592
Railway block signal and switch, W. F. Taylor, Jr 748,815
Railway, electric, C. J. Kintner 748,619, 748,620
Railway rail and joint therefor, J. Mallat .. 748,764
Railway safety system, electric, C. J. Kintner 748,621