

TYPE-WRITER ATTACHMENT.—W. C. PLANK, Las Flores, Mexico. The principal object of the invention is to provide means for allowing the carriage to move varying distances according to the letters struck, so as to provide a uniform spacing between the adjacent letters instead of between the centers of the letters. This will greatly improve the appearance of the work, and it is accomplished without greatly modifying the construction of ordinary machines and permits the use of regulation printing-type; and use of capitals without striking the spacing-bar afterward.

TRANSMISSION MECHANISM.—J. J. TRÖGER, Chicago, Ill. The principal objects of the invention are to provide for obtaining the same number of different speeds in both the forward and reverse motion with the use of fewer gears than are ordinarily used in reversing and varying speed devices; also, to provide a device which will give additional speed in both directions by the simple addition of two gears; also, to so construct a device that all the gears can be placed in an oil-tight case, and readily lubricated.

SPEED-INDICATOR.—L. L. B. DENIS, 135 Boulevard Menilmontans, Paris, France. The device is so constructed as to indicate even at a distance the speed of a part to which a rotary motion is imparted, such speed being expressed, according to the applications, either by the number of turns per minute in the case of a machinery-shaft, or, for instance, in the case of a motor-car by the journey run by the rim of the wheel within a given unit of time, miles run in an hour, etc. It can give the number of pulsations per minute made by a part having a reciprocating motion and operated by a crank.

DRIER.—R. F. CORDERO, Rubio, Tachira, Venezuela. This invention pertains to improvements in driers for coffee, cereals, fruit, etc., an object being to provide a device by means of which the material may be rapidly and thoroughly dried. When the drier is used for drying fruit or the like, the several plates which are designed to prevent the passage of hot air to the middle portion of the drier-section when the drier is used for coffee, cereals, or the like, are removed.

TRANSMISSION MECHANISM.—F. STRICKLAND, Muskogee, Ind. Ter. The object of this inventor is to produce a mechanism which will operate to transmit power at a varying-speed ratio. It is applicable in connection with many machines having a reciprocating part which does work on one stroke only. By means of the invention the return stroke is made at a greater speed, so that the power is most advantageously applied to the work.

THEATRICAL APPARATUS.—R. F. STALEY, Rochester, N. Y. The object of the improvement is to provide certain improvements in apparatus whereby a group of stage properties representing a set of articles belonging to one scene may be almost instantly transformed to a set of different articles belonging to an entirely different scene—for instance, changing a scene representing a cooper-shop to one showing the interior of a room—the transformation taking place without changing the position of the properties on the stage.

TYPE-WRITER.—E. B. PIERCE, Alameda, Cal. The invention more particularly relates to mechanism for returning the carriage to its initial position and for advancing the platen. Its principal objects are to provide means for effecting the reversal and feed, either automatically or manually, with minimum effort on the part of the operator, and in either case to effect this speedily and with little shock upon the machine.

COTTER.—T. F. MCANDREWS, Cohoes, N. Y. In this case the invention has reference to cotters used on motion-roads using a taper key or gib; and its object is to provide a new and improved cotter arranged to eliminate the possibility of losing the rod-key when the gib is set out properly against the rod.

PHOTOGRAPHIC-PRINTING MACHINE.—J. F. JUNGKIND, Little Rock, Ark. There is provision in this invention for conveniently turning on and off the light at the desired times; for also manipulating a red light in a most convenient manner, so that it will always be lighted when desired and extinguished when not needed; to provide for printing both from plates and from films, and further, to provide for holding the printing-paper in contact with a negative.

FEED-REGULATOR.—G. HALLIDAY, Superior, Wis. The invention is an improved feed-regulator for the feeding of grain and other materials in a broad, thin, and continuous stream. The invention contemplates a device which shall be an effective means for positively distributing grain uniformly and at any desired rate.

HAND DEVICE FOR OPERATING SEWING-MACHINES.—MILDRED J. RAPIER, Beaumont, Texas. The aim of this improvement is to provide a device which shall be capable of rapid and easy adjustment, whereby it may be put into combination with the drive-wheel of a machine to enable persons who through illness, accident, weakness, etc., are incapable of operating the ordinary foot-treadle of a machine to operate sewing-machines by hand-power.

ACETYLENE-GAS GENERATOR.—B. W. SCOTT, San Jose, Cal. The intention in this improvement is to provide an apparatus for generating gas from carbide which will be

simple, compact, and thoroughly safe and so constructed that the feed of carbide may be made automatic when desired, but wherein the feed of carbide at all times will be under the control of the attendant.

MOLDING-MACHINE.—H. BESSER, Alpena, Mich. The objects of the invention are: to quicken the closing of the mold, so as to save time; to render certain parts of the mold as nearly as possible automatic in their movements; to enable blocks to be molded directly upon the ground or similar surface, so that the blocks when finished will continue to occupy positions originally occupied by the material of which blocks are made, and to facilitate the construction of waterproof blocks. Mr. Besser has invented another molding-machine in which the more particular object is to produce a type of machine suitable for molding bricks and blocks of concrete or other plastic material and from which the molded blocks may be readily detached.

Medical Appliances.

DENTAL FLOSS-HOLDER.—C. M. OVERBAUGH, Clarion, Iowa. This invention refers to improvements in holders for floss employed in dentistry for cleaning between the teeth, the object being to provide a device of this character that will be simple in construction in which new lengths of floss may be quickly adjusted when required and tightly clamped.

TABLET-MACHINE.—J. V. BRANN, Knoxville, Iowa. Mr. Brann's invention is an improvement in machines for molding and compressing tablets. The machine may be made to manufacture any desired number of tablets at a single operation and is especially suitable for physicians' use, since it may be constructed at small expense and is capable of producing either compressed tablets or tablet triturates.

Prime Movers and Their Accessories.

ENGINE.—A. S. BARNES, Batavia, N. Y. The improvement is in an engine adapted for the use of steam, gas, or other motive agent. The engine comprises a casing, a piston mounted to swing in the arc of the circle in the casing, a crank-shaft, a connection between the piston and crank-shaft, an inlet-pipe for a motive agent, a valve for controlling the inlet, a cam on the crank-shaft for operating the valve in one direction, an exhaust-pipe, a valve for the exhaust-pipe, a cam on the crank-shaft for moving the valve in one direction, and a pipe leading from the exhaust into the upper portion of the casing.

ASH-PAN FOR LOCOMOTIVES.—C. G. ECKENRODE and N. BALDWIN, Pierre, S. D. The invention has reference to an improved construction in ash-pans for locomotives whereby the pan may be dumped at any time by the movement of a single lever within easy reach upon the cab. The ashes may be dumped from the pan in a few seconds without the fireman leaving the cab or climbing to any dangerous position.

Railways and Their Accessories.

AIR-BRAKE ATTACHMENT.—G. EMERY, Argenta, Ark. Primarily the object of the inventor is to so construct the usual angle-cocks applied to the train-lines in air-brake systems that should the cock be accidentally, maliciously, or otherwise closed during operation of the train the engineer will be instantly informed, thus avoiding the possibility of the engineer running the train in ignorance of the fact that a part thereof is cut off from the brake control.

GRAIN-DOOR FOR CARS.—E. SCHREIBER, Atchison, Kan. The door is such as is used on freight-cars for preventing the leakage of grain in shipment. The object of the invention is to produce a door which may be easily closed or opened and held out of the way so as to clear the doorway. The purpose more specifically is to produce a door which will be light and admirably adapted to support the pressure of the grain within the car.

Pertaining to Recreation.

FISHING-REEL.—T. V. BUCKWALTER, Altoona, Pa. The object of the invention is to provide a reel of simple and strong construction and which permits the strain in winding the line upon the spool to be exerted in the plane of the longitudinal axis of the rod, and thus obviates a distortion of the same in the hand of the operator.

HAMMOCK.—E. F. PILLMAN, Boston, Mass. One object of the invention is to provide a frame on the order of a tripod and which occupies a substantially horizontal position in use above the hammock, which frame is provided with means for connecting it with the back and the front portions of the hammock and also with an overhead support.

GEAR FOR MERRY-GO-ROUNDS.—W. F. MANGELS, New York, N. Y. The object in this instance is to provide a gear arranged to accommodate any desired number of crank-shafts and to drive the same directly and at the same time from the main gear-wheel, thus obviating all compounding of the gear and rendering the merry-go-round simpler and more durable in construction and effective in operation.

PUZZLE.—W. J. BYCRAFT, Ashtabula, Ohio. The object in this case is to provide a simple and durable puzzle or game which is of suf-

ficient difficulty of performance to necessitate some skill and practice, which can be used as a puzzle by an individual or as a game by two or more, and which is easy and inexpensive to manufacture.

FISHING-FLOAT.—W. S. PETTIS, JR., Pass Christian, Miss. The invention resides in the peculiar form of detachable ring arranged on the quills of the float for attaching it to the fishing-line, and consists in forming the attaching-ring of helical coils of wire having an intermediate convolution thereof bent into loops or clamping form adapting the ring to be fastened on the line and carried thereby ready to be slipped on the float quills, effecting connection of the upper and lower ends of the float in desired adjustment on the line.

Pertaining to Vehicles.

VEHICLE COVER.—E. L. WESTBROOKE, Jonesboro, Ark. The object of the invention is to produce a cover properly supported and suspended from above the vehicle and capable of being dropped down around it and protect it from dust and at the same time is light enough to be readily drawn up from the vehicle when it is desired to use the latter. It is desirable as a protector from dust for automobile carriages, surreys, and the like.

DEVICE FOR RETARDING THE REBOUNDING ACTION OF SPRINGS.—A. C. WALLING, Belleville, N. J. The object of the invention is to provide a device for preventing or retarding sudden rebounding action of springs in the space between the axle and the body or frame of the vehicle to insure easy riding to the occupants of the vehicle and without danger of the occupants being unduly jolted or unseated when the vehicle passes over deep gutters or over stones and other obstructions.

NECK-YOKE ATTACHMENT.—D. N. LUSE, Carroll, Iowa. Many accidents are caused by poles dropping, and thousands are annually killed or crippled by the use of unsafe neck-yoke centers, and the safety feature of this device is therefore of great importance. The safety-stirrup being in the rear of and engaging with an eccentric flange will prevent the pole-section from becoming displaced, and will hold same securely on the pole-tip without interfering with any of the desired movements of the pole-section, the stirrup forming a safety device which catches behind the flange on the pole-tip and securely braces by a brace-loop. The yoke is turned one-half round in order to be placed on and removed from the tip.

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.



HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn. Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(10386) E. O. H. asks: Will you kindly inform me what composition pulp or fiber water pails, tubs, and trays are made of? Also kindly explain how they are formed or pressed. A. Old paper stock is boiled to a pulp with water. It is then pressed to remove the excess of water and mixed with glue, gum dextrine, starch paste, or rosin size and pressed into oiled molds under heavy pressure. Dry. Then soak with linseed oil and dry with heat. It is usual to add some mineral weighting material to the pulp, such as clay, barytes, etc.

(10387) F. R. J. asks: How should paper to be treated (manila or wood pulp or straw paper) to prevent mold when placed on damp or moist surface? A. Any antiseptic chemical can be used; as these are all poisonous, paper so treated must not come in contact with edibles. Bichloride of mercury, sodium fluoride, carbolic acid, salicylic acid, or benzoic acid are a few of such chemicals. The essential oils are also very good, and would not be poisonous to any extent; dissolve in alcohol and flow it over the paper to be treated. Oil of sassafras is one of the cheapest that can be so used. Oiling or paraffining the paper will also serve.

(10388) B. J. L. asks how to digest old rubber. A. Place the material, cut in small shreds, in a strong (boiler iron) airtight vessel, provided with a good safety valve, and introduce into it 4 or 5 parts of bisulph-

ide of carbon for each part (by weight) of rubber. Close all the openings, and place the vessel over a suitable water bath or, what is better, have a small steam coil inserted within the boiler. Heat for an hour at the boiling point of water. This will insure the complete solution of the rubber. The vapor of the bisulphide is very inflammable; and when mixed with air, it is explosive when ignited. For these reasons, as well as because of the offensive odor of the solvent, the operation is best conducted in the open air, and with steam heat only.

(10389) E. E. S. desires a method of identifying the element rhodium, also its chemical reactions, which would enable one to test ores for the presence of the above-named substance. A. The separation and detection of rhodium is difficult and requires expert chemical work; it would be impossible to give any simple method of detection, as it is always associated with other metals of the platinum group. There is no book published devoted to the analysis and separation of the rare earths. The information must be obtained by consulting the various standard works on chemical analysis and by looking through the journal literature. Fresenius' "Qualitative Analysis" gives considerable information as to rhodium, as well as on the other rare metals.

(10390) J. W. W. wishes to know what is best for a mold to burn a substance at a red heat that will not crack or give? Have tried wrought iron. Cast sometimes gives or bends. How would fire clay or the same composition as Berlin crucible do? Can you give me a formula for it? A. Fire clay, mixed with some molder's sand, or kaolin, can be used for making such molds. If mixed with stale beer or ale, it gives a firmer mold than if mixed with water. Phosphate of lime, also mixed with stale beer, gives a very clean, white mold, but is not strong. Thoroughly dry and bake before using.

(10391) R. M. L. asks how to preserve flowers. A. I. A method of preserving the natural colors of flowers, recommended by R. Hegler in the Deutsche Botanische Monatshefte, consists in dusting salicylic acid on the plants as they lie in the press, and removing it again with a brush when the flowers are dry. Red colors in particular are well preserved by this agent. Another method of applying the same preservative is to use a solution of 1 part of salicylic acid in 14 of alcohol by means of blotting paper or cotton wool soaked in it and placed above and below the flowers. Powdered boracic acid yields nearly as good results. Dr. Schonland, in the Gardener's Chronicle, recommends, as an improvement in the method of using sulphurous acid for preserving the color, that in the case of delicate flowers they might be placed loosely between sheets of vegetable parchment before immersion in the liquid, so as to preserve their natural form. 2. Insert their stems in water in which 25 grains ammonium chloride (sal ammoniac) have been dissolved. Flowers can be preserved in this way for fifteen to thirty days. To preserve them permanently for several months dip them into perfectly limpid gum water and then allow them to drain. The gum forms a complete coating on the stems and petals, and preserves their shape and color long after they have become dry.

(10392) C. N. asks how to join or weld tortoise shell. A. 1. Bring the edges of the pieces of shell to fit each other, observing to give the same inclination of grain to each; then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great as to burn the shell; therefore try it first on a white piece of paper. 2. Small pieces of good tortoise shell may be joined so as to form one large, apparently seamless piece in the following manner: Slope off the margins of the shells for a distance of about one-quarter of an inch from the edge. Then place them so that the margins overlap one another; and thus arranged put them in an iron press and immerse in boiling water for some time. The pieces by this means become so perfectly united that the joints cannot be seen. The filings and very small scraps may be softened in hot water and consolidated by hydraulic pressure in metal molds. Prolonged heating of the tortoise shell darkens it, and greatly lessens its beauty.

(10393) R. J. asks: Can you kindly advise us as to the best means of oxidizing yellow and red brass (in castings or in rolled sheets) copper and bronze. We have several showcases, the metal trimmings of which are backed with wood, rendering it impossible to heat same sufficient to oxidize in the usual manner. A. If the blackening effect is the one desired (and this is what is known as "oxidizing" in the trade) it can be obtained by using a very dilute solution of potassium sulphide, to which sometimes a little ammonium sulphate is added. As the article itself cannot be heated, it will be well to heat the solution of potassium sulphide.

(10394) F. T. H. asks: Will you kindly inform me what is the common practice in writing the past participle of the verb to arc, a term which I believe is common in electricity? Is this spelled *arced* or *arched*? Also, what is the practice regarding the spelling of the past participle of the verb *shellac*? Should this be spelled *shellacked* or *shellaced*? A. The word "shellac" is spelled both with and without a

k. As a verb its past participle is always spelled with the k, shellacked. If spelled shellaced, it must be pronounced with a soft sound of the c, as in the word lacee, which is not admissible. When the word ero as a verb shall find a place in the dictionaries, it would seem that it must be treated in a similar manner, and have the k inserted in its past forms, and for a similar reason.

(10395) J. P. says: Please give a recipe for a cement that will fasten unglazed porcelain to iron. A. 1. Melt carpenter's glue in wine vinegar, add a little Venice turpentine and boil up for half a day over a slow fire. 2. Mix 15 parts copal varnish, 5 parts drying oil, 5 parts turpentine, and 5 parts liquefied glue, and set in boiling water until all are melted together. Then stir in 10 parts of slaked lime. Use immediately.

(10396) W. H. T. asks: How is gas made from water? Is there a book that would enable a foundry foreman to learn how to make an analysis of the iron in his castings? A. Briefly described, water gas is produced by blowing steam through a layer of brightly glowing coal; the water is decomposed, and the coal is consumed; the gases coming off are a mixture of hydrogen, carbon monoxide, and hydrocarbons, with small amount of carbonic dioxide, and variable amount of nitrogen. When the coal cools off too far to further decompose the water vapor, this is shut off, and air is blown through until the coal again burns brightly and is ready for more steam. While the air is blown in, the gases are allowed to escape up the chimney, as they have no value as illuminant, and in fact would not burn at all. The water gas as it comes from the producer has very little illuminating power. This is imparted to it by enriching with benzine. There is no book which would explain to anyone not a chemist how to determine the amount of iron in brass or other castings. Such work must be done by a chemist. All books on analytical chemistry of the metals describe methods for this, but would be unintelligible to any person except a regular chemist.

(10397) R. G. P. asks: Are there any chime music boxes with a set of bells on them? How does the name chime get its name? A. The word chime comes from a Latin word, meaning bell, and also cymbal. Music boxes are made with sets of bells in them.

(10398) E. G. P. asks: How can a scratch be removed from the top of an oak table (highly polished)? A. If the scratch is only a slight, superficial one, it can usually be removed by rubbing with a rag soaked with crude oil. If a deep scratch, it will be best to rub down the whole top of the table with powdered pumice and crude oil, and then re-varnish.

(10399) G. P. O. wishes a process for galvanizing such as is done on the base boards for stoves. A. The article to be galvanized is first thoroughly cleaned by dipping in weak muriatic or sulphuric acid, and is then thoroughly dried. After this it is plunged in a bath of molten zinc, wherein it becomes coated with a layer of zinc, being what is known as galvanized. The surface of the molten zinc must be kept clean by sprinkling with powdered sal ammoniac and skimming off the dross from time to time.

(10400) G. G. G. asks: How can I gild or marble edges of books, to resemble as nearly as possible those gilded by publishers? A. To gild the edges of books, they are first trimmed smooth, then sized with egg albumen (white of egg) and gold leaf then applied. When dry it is burnished with agate burnisher. For mottling, a very thin solution of gum arabic is prepared in a tray, and the different colors are then shaken in or combed in. A half dozen or so of the books are held securely and evenly together, and the top, bottom and front edges are successively dipped in lightly, and the excess of color is each time blown off. Successful marbling is quite expert work.

(10401) W. J. D. asks: 1. Is there any method by which soft coal can be made into brick or lump form by mixing with other substances or by itself? A. The powdered or crushed soft coal can be pressed into bricks and then be partially coked to give strength. If the coal alone will not adhere sufficiently well on pressure, it can be mixed with pitch, and then partially coked. 2. Can the ordinary 150 deg. test kerosene oil be clarified to prevent the strong smell while burning in a lamp or wick oil stove? A. A good quality of kerosene will not give much odor in burning in a lamp or wick oil stove, if care be taken to keep the wick well trimmed, and to adjust so that it will burn without smoke. There is no way to further purify kerosene oil, as to make it burn without odor.

(10402) W. H. A. asks: 1. Does the process of steaming wood in any manner destroy the life of wood, and are there any limits to this destruction? A. The steaming of wood for bending purposes seems to do no injury, as the lasting quality of wood so treated is very evident in our old ships and bent wood in agricultural implements. 2. In small-boat construction is there any special process for steaming wood (pine or oak)? A. The universal practice is simply a wooden steam box connected to a closed kettle of water over a fire. 3. If there is a destruction of the vitality of woods, would there be a way of lessening this

effect? A. Even the steam boxes in use for many years retain vitality and strength in the wood to a surprising extent. We know of no needed improvement.

(10403) C. H. H. says: I wish to use my gasoline car during cold weather. Kindly tell me whether chloride of lime, added to the water used to absorb heat from the cylinders, will prevent the water from freezing when the machine is not in use, and the water is cold. What proportion of chloride of calcium should I use? What weight per gallon of water? A. Chloride of calcium (not chloride of lime) can be used to lower the freezing point of water. All dissolved salts tend to corrode metal more quickly than pure water, hence care should be taken to clean up occasionally so as to prevent corrosion.

(10404) H. E. H. wishes the exact number of pounds (16 ounces) a cubic foot of hydrogen gas will raise. A. One thousand cubic feet of hydrogen weighs 75 pounds less than 1,000 cubic feet of air at normal pressure and at the freezing point of water. It is customary to allow 70 pounds as the lifting power of 1,000 feet of hydrogen in a balloon, the difference being to provide for some advantage on the part of the hydrogen. It would balance 75 pounds, but lift 70 pounds with ease.

(10405) W. A. H. G. asks: 1. Can a plain slide valve steam engine be run by compressed (hot) air, or must the valves or packing be changed? A. Any engine that is suitable for steam is equally suitable for compressed air. 2. When air is compressed to one-fourth its volume, would it have four times the pressure (60 pounds per square inch)? Immediately after the air is compressed, its temperature will be quite high. After cooling, how much would the pressure decrease? A. Air compressed to one-fourth its volume without loss of heat will have a pressure of 89 pounds per square inch, or 60 pounds without heat, isothermal.

(10406) W. H. D. asks: 1. Is the hot flame from a needle hole through which passes the hot gases of vaporized kerosene a "boring" flame, as common gas is held to be, even on iron? A. All vapor gas jets when made to impinge on any body that will burn by heat may be said to be a boring flame. 2. If it is not a boring flame, is it advisable to apply it, in the firepot of a furnace, directly to the sides of the firepot to heat water or generate steam for house heating? A. A jet flame of any kind should not impinge directly upon a firepot, but directed around it. 3. If it is a boring flame, how can it be applied most economically for such heating? A. By jetting the flame around the firepot in a chamber of firebrick. 4. How can this fuel and flame be applied most economically to furnaces heating by hot air? A. By jetting the flame against a firebrick surface in the fire chamber. 5. We were much interested in your article on oil burners, but you did not give the furnace phase of the question. It will interest thousands of your readers. What burners are best adapted for such? A. There are a number of oil burners on the market which must be operated by steam or air pressure. 6. I have looked through shelf after shelf of engineering works, yet find no tabular schedule of atmospheric pressure, barometric height, altitude and boiling temperature. A. "Compressed Air and Its Applications," by Hiscox, contains a full table of barometric heights and boiling temperature of water (page 38); \$5 by mail. 7. As pressure exceeds normal, is the temperature of water the same as the steam? A. Yes. 8. When the steam gage shows pressure of 1 pound, does it not mean 1 pound above atmospheric? A. Yes. 9. According to all formulæ of heating, it seems to me a mathematical certainty that shutting off radiators in unused apartments economizes fuel in just the ratio of such cubic space or radiating surface. Yet I find men who contend there is no economy. My experience is in accordance with my belief and formulæ. A. Our experience is in the line of economy from closing radiators when not needed.

(10407) O. L. C. writes: Please see Not and Queries 10342. If reasoning there is correct, a hollow paper globe filled with hydrogen will fall as fast as a solid leaden sphere. The work-power to accelerate velocity and remove air depends on weight of body only. Since the resistance is the same, and the weight, therefore work-power, of lighter body is less, it must fall slower. The SCIENTIFIC AMERICAN is valuable, but not infallible. A. It is so evident that the answer to Query 10342 is incomplete that it is also surprising to receive so many criticisms on the matter. It is only necessary to say that the difference between free fall and a fall against the resistance of the air is not apparent for balls of lead and aluminium until a fall of about 100 feet is reached. Our authority for the statement is Mayer's "Mechanics," page 33. For all falls through short distances, the answer to which objection is made is practically correct. We, however, cheerfully admit that we are not infallible, not so infallible as our critics.

(10408) C. H. W. writes: I have for many years been reading with much pleasure and profit your answers to the varied questions that are addressed to you, and have learned to rely on them fully. Great is my surprise, therefore, to read, in Query 10342, your statement that "the two spheres of the

same size" [but of different weights] "will fall through a given height in the same time." It would be easy to show, mathematically, the falsity of this conclusion, but a more direct way would be a resort to experiment. If your principle holds good, a toy balloon, or even a soap bubble, would reach the earth from a given height at the same time as say a croquet ball of the same size. Try it. Or, if you prefer a rather more elegant experiment, make two pendulums of the same length with spherical bobs of just the same size, but one of wood and the other of lead, and start them swinging together and see if they will finally come to rest at the same time, as they should do on your theory. But enough; excuse my friendly criticism. A. The answer to Query 10342, to which your letter refers, by some oversight was inserted without the qualifying statement as to what height two metal balls may be dropped without separating perceptibly in their fall. It is stated by Mayer to be about 200 feet. See his "Principles of Elementary Mechanics," page 33, at foot of page. Your confidence in us might have led you to say that something had been omitted rather than to charge an error so swiftly. We have had much experience in teaching physics for nearly forty years, and are still in the harness. What you say about a soap bubble is hardly to the point. Lead and aluminium are more nearly alike in density than are lead and air. Dense metallic balls do not deviate from free fall perceptibly for quite a distance, say 100 to 200 feet. See Mayer as above. This question has been up many times. It seems to be always up. The literature of it in our query column is quite extensive. See Queries 9679, 9756, 9804, 9840, 9873, 9879. There have been others, but we do not have the references just now. These are within two years.

(10409) E. L. C. asks: 1. If a vessel sinks in five miles of water, will she go to the bottom? If not, why? I think she will; the others think not. A. If a vessel begins to sink, it must continue to sink till it reaches the bottom. If it is compressed by the pressure of the water as it goes down deeper and deeper, it becomes still heavier with reference to the water than it was at the surface, and at the surface it was heavy enough to sink. At greater depths it will be able to sink faster, since the water is not compressed to any extent at greater depths than it is near the surface. If anything can sink at all in water, it will go to the bottom before it stops. 2. If a man gets into a tank of water resting upon a pair of scales, and floats upon the water, will the scales register the man's exact weight in addition to the weight of the tank and water? Will it make any difference whether he floats or lets himself sink? The tank sides are high enough, so that no water can overflow. A. The balances will show the weight of the man in addition to the weight of the tank and the water. When the man gets into the water, the water rises in the tank; that is, it becomes deeper. It is exactly the same as if more water were poured into the tank. No one would doubt that the scales would show more weight if 100 pounds of water were put into the tank. Why not when 100 pounds of man are put in? This question has traveled for a century in various forms around the world.

INDEX OF INVENTIONS For which Letters Patent of the United States were Issued for the Week Ending February 19, 1907.

AND EACH BEARING THAT DATE [See note at end of list about copies of these patents.]

Table listing inventions and their patent numbers, including items like Abrading machine, Acid purifying, Adding machine, Advertising cabinet, Aerial navigation, Air and distributing water, Air compressor, Air compressor governor, Air coupling device, Alcohol and fatty acids, Amusement apparatus, Amusement device, Angle or splice bar, Animal trap, Animal trap, Anthracene derivative, Apparel wearing, Auger, post hole, Autographic register, Automobile, Automobile controlling means, Automobile radiator, Axle straightening device, Axle, vehicle, Raines & Schuessler, Axle, vehicle, R. Border, Bag, See Clothes pin bag, Bait trap and holder, Bales, compressing, Baling press, Ball transmitter, Banjo rolls, Basket, hamper, Battery vent valve, Beam straightening press, Bearing roller, Beater or mixer, Bed bottom fabric, Bed, invalid, Bedbug trap, Belt checking device, Belt, electric, Belt fastener, Belt shifter rods, Bending machine, Billets, swaging, Binder, temporary, Block forming machine, Block signal system, Blower, steam tube, Boat life, Boiler, S. Smith, Boiler flue cleaner, Boot and shoe tree, Boot, felt, Bottle, H. L. Clements, Bottle, G. N. Hardesty, Bottle, non-refillable, Bottle, non-refillable, C. A. Grimm, Bottle, non-refillable, J. Husser, Bottle, non-refillable, L. E. L. Themke, Bottle stopper, C. Raabruoh, Bottles, valve mechanism for, D. H. Monks, Bracket, T. C. Best, Bracket and support therefor, Braiding machine, A. Mann, Brick composition, L. Elkus, Brick drier, I. C. Jones, Brick drying and conveying apparatus, J. H. McKenzie, Bridle for horses, S. P. Knut, Bridle, safety, H. C. Thompson, Brush, tooth, E. Penkala, Buckle, Roy & Burton, Buckle, trace, J. T. Barker, Building block, Sewall & Keene, Building structure, R. Yoakum, Bundle loader, J. S. Richardson, Bung and cork extractor, J. Prabh, Burette, automatic, A. J. Marschall, Cabinet, credit, Ellett & Vick, Cabinet, delivery, D. H. Wehagen, Cableway, suspension, McCormick & Flory, Calculating device, B. M. Des Jardins, Campaign device, G. A. Beidler, Camping outfit, combination, C. Massey, Can, See Rectangular can, Cans and the like, apparatus for treating tin, M. Leitch, Candy machine, Z. S. Hoffman, Cane knife, foot power, W. L. Spencer, Car, Boole & Stephenson, Car, auto snow, J. Sherwood, Car brake staff, railway, E. Posson, Car coupling, A. J. Bazeley, Car guard, street railway, S. E. Pressler, Car haul safety device, W. W. MacFarren, Car magnet support, W. M. Brown, Car, semiconvertible, E. T. Robinson, Car switching mechanism, railway, W. C. Sharp, Car ventilator, P. P. Carroll, Car vestibule, E. L. Forsgren, Cars, card holder for railway, E. Gurley, Cars, steam heating system for railway, A. Hillisch, Carbureter, L. Renault, Carbureter, C. Smith, Carbureter, M. D. Colbath, Carbureter for explosive engines, double, T. L. & T. J. Sturtevant, reissue, Card score, P. H. Keefe, Card feeder for intermediate, Petterson & Rae, Carrier holder, filling, Boissonneault & Boucher, Casting machine, McGlone & Ross, Catapult, S. D. Dills, Catheter user's mechanical assistant, J. F. Spalding, Cement and apparatus therefor, process of burning, C. Ellis, Cement block machine, J. H. Miller, Cement building block making machine, A. H. Coombs, Cement, manufacture of, F. M. E. von Mollenbruck, Cement roofing tiles, machine for making, J. Liening, Cesspool, E. Helber, Chain, drive, G. K. Howe, Chain, solid link knife jointed, H. A. House, Chair, J. Salomon, Chair, J. S. Lester, Change making machine, H. Binney, Check, sales, G. Heinersdorf, Check, drill, R. Temple, Churn, T. Cheney, Churn and butter worker combined, G. J. Kaplan, Churn butter, S. M. Pearson, Cigar lighting apparatus, electric, S. M. Meyer, Circuit breaker, F. O. Hartman, Circuit breaker for electrical conductors, W. C. Shaw, Closure, valve, G. Demacacos, Clothes drier, folding, D. Sherlock, Clothes pin bag, I. S. Vanderbilt, Jr., Clutch, J. A. Russell, Clutch, J. C. Dawson, Clutch controlled elevator, H. H. Cutler, Clutching device, D. E. Krause, Coal drill, J. Katulka, Coal hod, G. J. Duffett, Coat and hat rack, combined, P. Hallen, Coffee making apparatus, W. C. Richardson, Coffee pot filter, C. Monroe, Coin controlled mechanism, M. O. Anthony, Colors, yellow and orange pigment, M. Becke, Column, G. P. Thorn, Comb, J. J. Schurz, Comb and fat fastener, combination, P. Edwards, Compasses and similar instrument, C. M. Bernegau, Compensating mechanism, Osborn & Mannis, Compound engine, M. A. Neeland, Concrete and metal construction, A. L. Johnson, Condensation preventer, E. O. Capen, Conenser, N. H. Hiller, Conduits, pulling box for, A. Hawkinson, Confection forming machine, W. W. Iyisig, Control system, White & Pease, Controller, H. E. White, Controller, three-wire reversible drum, T. E. Barnum, Controlling and positioning device, B. O. Hale, Cord and rope machine appliance, P. M. Stegmaier, Cord or string cutter, A. F. Hoffman, Core, F. W. Young, Corner bead for the protection of plastered corners, metal, G. S. Knapp, Corner strip, E. Nichols, Cot back, adjustable, B. C. Leavitt, Cotton gin, L. David, Cotton picker, O. H. P. Cornell, Cracker box, J. B. Arthur, Crane, kettle, L. H. Reibold, Crane, overhead traveling, C. L. Taylor, Crane, tunnel, E. L. Smith, Crate, R. Morgan, Crate, knockdown, W. H. Barnes, Creosote trap, E. C. Cole, Cross tie, metallic, M. F. Bonzano, Cult holder, G. L. Scheffer, Cultivator, gas and fertilizer distributor, G. D. Bennett, Cup and cup handle, G. F. Walker, Currents, increasing the efficiency of alternating, I. Kitsee, Currents, means to increase the efficiency of alternating, I. Kitsee, Curtain bracket, window, L. E. Gillmore, Curtain pole, J. E. Willson, Cutting board, W. A. Harman, Cutting implement, H. Harden, Dam and apparatus for and method of constructing the same, H. L. Cooper, Dental gold net holder, H. P. Davis, Derrick, Allan & Price, Designs to surfaces, applying, D. B. Marwick, Die and pattern making machine, F. P. Pfeigbar

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