automatic carbureter. The Gobron-Brillié motor was one of the first to be adapted to the use of alcohol for fuel. The motor on the record-breaking racer is said to develop in reality nearly 130 horse-power.

All three of the machines illustrated are prospective contestants in the Gordon Bennett Cup Race to be held in Germany in June.

The last event of the day was the third annual hill-climbing contest for the De Caters cup. This cup was first won by Serpollet in 1902, the contest being that year held over a kilometer course on the long Nice-La Turbie hill on the Corniche road, and Serpollet's time being 59 seconds. Last year the test was made over a like distance on Laffrey hill, and Rigolly, on the same Gobron-Brillié machine which Duray is driving this year, cut nine seconds off Serpollet's record. The test this year was over a 500-meter (547-yard) course on the Nice-La Turbie hill, which has an average gradient of about 10 per cent. Duray, on the three-speed machine that won last year, won again this time in 26 seconds, Rigolly, on the four-speed Gobron-Brillié, taking one second longer. Werner, on the 80-horse-power Mercedes, was fourth in 28 seconds. Another Mercedes came in fourth in 28 3-5 seconds, while the Napier racer took fifth place in exactly half a minute. Fletcher and Jenatzy, on Mercedes cars, made a dead heat in 30 1-5 seconds.

The motor-boat races, which were sailed over a hexagonal course 12.5 kilometers (7.84 miles) in length in the Bay of Monaco, began on April 5 with a 150-kilometer (93.15-mile) race for the large, powerful racing boats less than 8 meters (26¼ feet) in length and having a total cylinder capacity less than 7.5 liters (457.66 cubic inches); and with a 60-kilometer (37¼-mile) race for the smaller cruising launches less than 6.5 meters (21.32 feet) long and with a cylinder capacity of less than 2.5 liters (152.55 cubic inches). A special traveling crane conveyed the boats from the exhibition space to the water's edge, and laid them upon a long incline running out into the water, down into which they were readily slid.

The 150-kilometer race was won in 4½ hours, 22 1-5 seconds by "La Râpée III.," a 7.98-meter (26.18-foot) boat built by Tellier and fitted with a Panhard & Levassor, four-cylinder, 35-horse-power motor having a cylinder capacity of 7.363 liters (449.30 cubic inches). The "Princess Elizabeth," which came in second in 5 hours, 18 minutes, and 4 seconds, is exactly the same type and length of boat, and is fitted with a four-cylinder Delahaye motor having a cylinder capacity of 7.443 liters (454.186 cubic inches).

Out of seven racers and six cruisers which started, only three of the former completed the race, while five of the latter succeeded in finishing. This shows that the ordinary launch with an engine of moderate horse-power is much more reliable than the light racing shell propelled by a high-power motor and generally termed an autqmobile, or motor, boat.

The winner of the 200-kilometer (124.2-mile) race—the "Trèfle-à-Quatre"—as well as "La Râpée III.," are shown in the photographs taken during the race. An idea of the fine lines of these boats can be had by noting the bow wave, which is so thin as to be quite transparent, the waterline of the boat being readily seen through it. The "Trèfle-à-Quatre" is fitted with a Georges Richard-Brazier four-cylinder motor. Its time for the 200 kilometers was 5 hours, 16 minutes, 51 3-5 seconds.

The motor-boat races were carried out successfully and with but one serious accident. This happened to the "Parisienne II.," a very long racer equipped with three motors of about 70 horse-power each. This boat caught fire from a gasoline leak, and the gasoline in her tanks made a furious flame. The three men of the crew escaped by jumping overboard, and two of them were badly burned. As the boat had a steel hull, it was not destroyed, although the engines were ruined.

There are said to be 42,000 locomotives in this country, and of these about 3,200 are supplied with electric headlights, while 1,650 are equipped with acetylene generators. The remainder of these engines are making use of oil for the headlight illuminant.

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

PRINTING-TELEGRAPH RECEIVER.—J. D. WHITE, 50 Clanricarde Gardens, London, England. The present receiver differs in various ways from a simple form of printing-telegraph receiver and one more complex described in two former patents granted to Mr. White. The mechanism is operated by an electro-mechanical device by which the rotation of the type-cylinder is effected by currents of one polarity sent along a single wire, while the other cylinder is operated by currents of the opposite polarity sent along the same wire; but the operation is not limited to this particular device. It may also be operated by any of the other electro-mchanical devices used in receivers to rotate type wheels and to effect printing.

RELAY-MAGNET.—W. PALMER, JR., Rincon, New Mexico. The object in this case is to provide a simple and practical relay-magnet of a kind designed to enable the current from a local battery to be directed at will through either one of two electromagnets by merely reversing the polarity of the current on the main line at a remote point.

MEGAPLEX RELAY.—R. A. ENGLER, Dubuque, Iowa. In Mr. Engler's invention the improvement relates to relays, and more particularly to a type of relay for increasing the effect of feeble currents—such for instance, as are employed in telephony. The structure is such as to increase the effect in various ways, and especially to permit several distinct devices to act cumulatively.

Hardware.

SASH-FASTENER.—J. A. LONG, Spokane, Wash. In this patent the invention relates to a device for securing the meeting-rails of an ordinary window-sash that operates in a vertical direction. One object is to provide an improved form of sash-fastener that will engage the under face of the upper-sash rail and not be dependent upon the means of securing one portion of the sash-fastener to said rail. Another, to provide an improved form of device that will securely hold the rails together and prevent unauthorized operation of the window-sash.

WIRE-FENCE TOOL.—J. A. MILLER, Avondale Col. In the present case the invention pertains to tools employed in the erection and repair of wire fences, and has for its object to provide a tool of that character having details of construction that adapt it for efficient service as a wire-stretcher and a staple-pulling implement.

LEVEL, PLUMB, AND INCLINOMETER.—J. HAPPLE, Cleveland, N. Y. The purpose in this instance is to provide details of construction for a device which adapts it for convenient and reliable service to determine if an object or surface that may be fixed or movable is plumb, level or inclined, and define the degree of inclination or deviation from a perpendicular or horizontal plane.

SASH-LOCK.—C. W. RANDALL, Lockport, N. Y. In this lock the object in view is to provide a device which may be applied to one of the meeting-rails of a pair of sashes, said device serving to hold the sash or sashes in adjudged positions for preventing rattling thereof under the pressure of wind, the device being readily adjustable to sashes of different thicknesses in order that it may be used generally on different sizes and styles of sashes.

Household Utilities.

SAD-IRON.—M. JOYCE, Salt Lake City, Utah. To enable this iron to compete commercially with cheaper irons, the inventor casts the body in one integral piece, with guide-lugs projecting upward therefrom, and provides a wooden handle with a metallic connection-plate adapted to lie between the lugs of the iron-body and separated from the handle by a non-conducting shield, said plate having a stop-bar and a spring-dog connected with a headed pin or screw fastened on the upper side of the iron-body. The invention relates to irons of the type disclosed in two prior patents granted Mr. Joyce.

BED-COVERING.—E. W. BROWN, New York, N. Y. Mr. Brown's invention relates to coverings for beds, couches, cribs, and cots. His improvements enable the bed-clothing to be fastened in place easily and quickly so that the covering cannot be "kicked off," thus affording protection to the sleeper. Covering may be suspended in elevated position and in a way form a drapery, which depends from the suspended covering to the sides and foot end of the bed, thus keeping from coming in contact with the person, while protecting from drafts.

Of General Interest.

SELF-LOCKING TACKLE-BLOCK.—J. O. WALTON, Boston, Mass. The present invention consists in a simple guard combined with or formed on the block on its rear side just behind the cramping-pulley, so that the run of this part of the rope will be thrown laterally away from the cramping-face on the rear side, but will not interfere with the locking of the rope on the front side. A self-locking pulley-block has been shown and described in a former patent granted to Capt. Walton.

WINDOW-CLEANER.—J. C. G. FRITZ, New York, N. Y. The object of the invention is to provide a window-cleaner more especially designed for use on windows of locomotive-cabs, platform-windows of street-cars, and other vehicles and arranged to permit the engineer, motorman, driver, or other person to keep the outlook-window perfectly clear from frost, moisture, dirt, and the like and permit at all times a clear view of the path in front of the vehicle to avoid collisions.

NON-REFILLABLE BOTTLE.—W. C. BEAL, Fernandina, Fla. In this patent the improvement refers to a class of liquid-packages that are provided with means to expose or prevent the reuse of the receptacle after the contents have been removed, and has for its object to purovide novel details of construction for a bottle and its closure which will effectively prevent the refilling of the bottle after the contents have been partially or wholly decanted.

GARMENT-SUPPORTER FOR MEN.—W. A. WRIGHT, New York, N. Y. The purpose in this case is to provide a form of garment-supporter especially adapted for use in connection with trousers and so constructed that it will include a button or stud to receive a suspender-end, a member for supporting engagement with a pair of trousers, a member, if so desired, adapted to prevent the upward movement of a belt, and a member whereby to apply the device to the inner face of the trousers waistband.

STEERING AND STEADYING MECHANISM FOR BOATS.—W. H. YOUNG, Troy, N. Y. In this patent the invention has reference to improvements in steering and steadying mechanism for marine vessels, the object in view being the provision of a simple means whereby the boat may be easily steered and also prevented to a great extent from rocking and pitching.

CIGARETTE OR CIGAR BOX.—A. G. PSIAKI, New York, N. Y. The present invention has reference to improvements in cigarette or cigar boxes of the kind in which cigarettes or cigars are originally packed for sale; and an object is to provide a box of novel construction and having a receptacle for holding matches furnished with each package.

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Highest references.

Inquiry No. 5449.—For the address of the Furber Patent Shoe Company.

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Inquiry No. 5450.—For the address of the U. S. Silver Co., also of the Crown Silver Co.

Patentable, combined working machine for sale. For cabinet makers, machinists, amateurs. Has capacity of 12 different apparatus. Foot power. Also a working bench to match. All rights to buyer. Sold separately or together. Buddig, Eustis, Neb.

Inquiry No. 5451.—For manufacturers of machinery for making tooth brushes.

FOR SALE.—35 H. P. Berger Gas Engine. A splendid engine at a bargain. Burrell & Morgan., Elkhart, Ind.

Inquiry No. 5452.—For the address of the Pyle National Electric Headlight Co.

FOR SALE.—Home and foreign patent rights covering Combination Pastry Knife. Comprises five utilities. Cost 3 cents to manufacture. Adapted to mail order custom, F. A. Tobler, Bisbee, Arizona.

Inquiry No. 5453.—For makers of a bower-barffing equipment.

Inquiry No. 5454.—For dealers in sulphuric acid in tank cars in quantities.

Inquiry No. 5455.—For a small ice machine, which is not expensive, and which is realy suitable for family use.

Inquiry No. 5456.—For the address of Geo. W. Shaw, manufacturer of wooden mantels, coal and gas grates.

Inquiry No. 5457.—For an electrical device by means of which the number of feet of water in a reservoir or tank can be ascertained at a distance of 4 or 5 miles.

Inquiry No. 5458.—For manufacturers of stamped steel ceilings.

Inquiry No. 5459.—For machines for making paper boxes and cartons.

Notes and Queries.

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.

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(9378) H. L. J. says: I was recently shown an optical illusion which puzzles me. A chicken feather was placed near my eye, and looking through it at my hand with fingers slightly opened, and distant about 15 inches, I saw the bones in my fingers, as clear and distinct in outline as with the X-ray. So did others of the party. Again, the feather held in same manner between the eye and the sun when near the setting horizon, showed all the colors of the rainbow in same order and position. Please give the philosophy of all this. A. The experiment you made in looking through the meshes in the feather was an experiment in diffraction. When you looked at your finger held at a distance from the feather you saw a fringe or shadow which followed the outline of the edges of the finger. It did not resemble the outline of the bones at all, as they are seen on the fluorescent screen by X-rays. By the X-ray you see the bones as shadows, larger at the joints; you see the tapering shafts of the bones also. Here you only see the outline of the flesh of the fingers in a double line on each side of the finger. To test the matter use a lead pencil or a stick of about the size of the finger, and you can see the bone in a stick exactly as well as in your finger. There has been a very ingenious toy called the "bonescope" made on this basis. A piece of fine cloth is stretched over a half-inch hole in a bit of wood, which may be two inches across and a half inch thick. On looking through the hole in the center you may see all that you describe. The colors seen on the horizon and in looking at the setting sun are due to the interference of light. You will find all these appearances described, under "Diffraction and Interference of Light." The experiment is very curious, but is explained without difficulty. See Weight's "Light," which we can furnish for $2 mailed.

(9379) G. E. C. asks: 1. How many cubic feet capacity would be necessary in a tank or other reservoir, holding compressed air at a pressure of 200 pounds to the square inch, at the start, to run an engine furnishing 1 horse-power one hour? How large if the pressure was only 100 pounds at start? A. An engine running at a uniform air pressure of 50 pounds per square inch, at one half cut-off, requires 13½ cubic feet of free air per minute, delivered at ordinary temperature. The supply of air from a high-pressure tank, say of 200 pounds to 50 pounds, reduces the temperature over 300 deg. F. with an expansion of about two and one-half volumes; so that if heat can be added to the air after expansion from the tank, a considerable economy may be obtained in using compressed air from both pressures. The tank must have a reserve ca-