

the inside of a pane of glass and is arranged to give a highly-ornamental effect. The letters can be readily fastened to the inside of the glass pane without destroying their concave appearance, at the same time permitting a cleaning of the window both inside and outside without danger of detaching the letters.

WRENCH.—JOHN J. BARCLAY, Elizabeth, N. J. The wrench comprises a shank with a fixed jaw, a movable jaw, and a retarding spring for the movable jaw. The shank and the opening in the movable jaw receiving the shank are so constructed that the movable jaw can be unobstructedly carried to or from the fixed jaw, and that the movable jaw will remain fixed on the shank as long as it is subjected to forcible engagement with a nut, pipe, or the like.

CABINET.—FREDERICK WADELL, Louisville, Ky. The purpose of the invention is to provide a cabinet for medicines and other articles. The cabinet is so constructed that it can be used as a writing or reading desk. Stationary receptacles are employed in conjunction with a revolving receptacle, which receptacles are so arranged that they may be compactly combined. The revolving receptacles contain an interior chamber not accessible to persons unfamiliar with the cabinet.

BOX.—JEAN H. KASSCHAUF, Brooklyn, New York city. This box is a knockdown box so made that its several members can be rigidly and strongly connected without the use of nails, screws, hooks, or staples. The box can be quickly assembled and separated when it is desired to pack the several members closely together for reshipping or storage.

BOTTLE-CAP.—ALFRED L. BERNADIN, Evansville, Ind. Caps for whisky-flasks are ordinarily made of soft metal, with the result that the threads are often stripped when pressure is applied in turning the cap tightly upon the bottle-neck. The inventor has provided a novel form of cap having an inner shell of hard metal, which is threaded to fit the threads of the bottle-neck. An outer shell encloses the inner shell and forms a smooth cover for the cap. Thus a cheaper and more durable cap is provided than is otherwise possible.

BOOT-TREE.—MARY J. HALL, Aspen, Colo. The tree is composed of body sections provided in their inner faces with openings for bearing-pieces for a shaft and sleeve and for a pivot-shaft on an instep-block. This instep-block has its shaft held in the two sections; and the bearing-pieces for the shaft and sleeve have their trunnions held in their respective openings. A rocker is supported on the bearing-piece for the screw-shaft and has means for operating the instep-block. The body-sections are spread by a screw-shaft and retracted by a spring. A threaded sleeve is arranged to operate the rocker.

AERIAL WHEEL.—STEWART CAIRNCROSS, Grafton, N. D. This windwheel is designed to operate pumps, grain-separators, threshing-mills, dynamos, and other small machinery. The wheel comprises a hub, a peripheral frame, wires extending radially between these parts and across the frame diagonally; and a series of sails, composed of flexible material and attached to both the radial and diagonal portions of the wires, whereby they are held in the diagonal position. Each sail is held taut and flat in a plane which is transversely inclined at an angle of forty-five degrees.

Designs.

SCREW.—HERBERT E. KEELER, Manhattan, New York city. The head of the screw is formed with two notches at right angles to each other, instead of one. Thus a screw is provided which can be readily driven into place, since one notch is always in position for the screw-driver.

CLEANER FOR KITCHEN UTENSILS.—WALTER J. TURNBULL, New Orleans, La. The cleaner is a simple, convenient device for cleaning pots in which food has been cooked. Means are provided for holding a dish-rag and for scraping the interior of the utensil.

WATER-TANK CASING.—GEORGE BECKING, 12th Street and C. S. R. R., Chattanooga, Tenn. The front portion of the body of the tank has a central vertical depression or concave, and the projecting corners are convex. The top or cover has an ovolo molding provided with a row of beads on the under side.

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NEW BOOKS, ETC.

FLAME, ELECTRICITY, AND THE CAMERA. By George Hes. New York: Doubleday & McClure Company, 1900. 8vo. Pp. 398. Price \$2.

This book is an attempt to briefly recite the chief uses of fire, electricity and photography, bringing the narrative of discovery and invention up to the close of 1899. As far as the book can, it traces man's progress from the cave man to the twentieth century scientists. It shows how progress has been accelerated by the electric current and the photographic ray. It is a most fascinating book and the story is told in the clearest possible language.

A HISTORY OF POLITICS. By Edward Jenks, M.A. New York: The Macmillan Company, 1900. 16mo. Pp. 174. Price 40 cents.

The book summarizes in a brief, popular form, the record of political action. Like other volumes of the Temple Primers, the subject is treated in a concise form and is admirably adapted for the use of the beginner.

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Notes & Queries

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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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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.

(7223) J. V. McA. writes: There was a very heavy cloud and a downpour of rain accompanied by sharp lightning during which the Methodist Episcopal church was struck and somewhat damaged in its spire. The point of the spire is about 50 feet from the ground and covered with a case of sheet iron. There is no metallic connection with the ground. Directly under the spire, and running half way up is a gas pipe. Three men were working in the church and were unharmed, although two of them were very close to the pipe, one of them not more than 18 inches away. They saw an explosion at a brass fitting which was exposed, but felt no shock. The shingles with which the spire was sided were knocked off all along the one side and at the top where the shingles extended under the sheet iron cap, it looked as if the lightning had gone up instead of down. There was a terrific crash which, to some, seemed to be at a greater distance than the church, and to have been more severe than the one which struck the church. Could it have been that the cloud was charged positively and the earth negatively, and the restoration of the equilibrium, after the discharge, have caused the "fluid" to run up the spire and so have caused this damage? Some of us think so, as so many things seem to point that way. Does electricity ever do damage in rising from the ground? A. We do not know that the electric discharge takes place from + to -. It is conventional to regard it as doing so. Thompson says "No exact evidence exists as to the direction in which the current in a wire really flows." Many people see the lightning go up from the earth to the cloud rather than down. Since the flash lasts but a minute fraction of a second, the eye cannot determine the direction of the motion. We must consider that the impression of downward motion is subjective, and is due to the fact that a downward flow is more natural to us. In clear weather the atmosphere is usually plus to the earth. One observer found it minus but six times in fifteen years. But in stormy weather the sign changes very capriciously and frequently. In thunder storms the change is still more rapid, so that it is impossible to say whether the cloud at the moment of this flash was positive or negative to the earth, or whether the flash went up or down. It may have gone in either direction, or more probably it surged back and forth many times while the flash lasted. The description shows that the gas pipe was not in the path of the discharge. By induction it became charged with electricity, which made the flashes seen by the workmen at the same moment that the flash from the cloud passed by. All pointed objects under a thunder cloud become charged with electricity, and discharge it up toward the cloud, in streams which in the dark can be seen as brushes of light. This is similar to the brushes seen upon the points of an electric machine when it is working in the dark. One may see these brushes if near the top of a lightning rod when a shower is rising. This is what the men in the church saw on an intensified scale, because the grand discharge was going on so near the gas pipe. From what has been shown it is clear that a discharge of lightning will do equal damage in which ever direction it goes. It is the discharge which does the damage, and not any secondary restoration of equilibrium. The supposition of a secondary reaction is not necessary.

(7224) E. R. asks: 1. What is the best method for preparing shellac for insulation on magnet wire? A. Dissolve gum shellac in alcohol, equal parts by weight of each. It will probably be easier and cheaper to buy the ordinary brown shellac from a painter. 2. Is the gage of iron and steel wire the same as copper? A. Yes. Ordinary wires of all metals are numbered by the same gage. Piano wire has its own set of numbers by a different gage. 3. What is the resistance of soft iron wire No. 20, per 100 feet? A. 6.1 ohms, very nearly.

4. How does iron compare with copper in resistance? A. Iron wire has 606 times as much resistance as a copper wire of the same size and length.

(7925) C. W. asks if you are required to get a license for a steam launch, if you do not use coal for fuel? A. Yes, on all navigable waters in which other vessels ply. The kind of fuel is not considered.

INDEX OF INVENTIONS

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

JULY 17, 1900.

AND EACH BEARING THAT DATE.

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Table listing inventions and patent numbers. Includes items like: Abrading or polishing machines, means for operating, C. S. Yarnell, 653,726; Air brake coupling, automatic, L. C. Cary, 653,657; Alarm, See Low water alarm; Anchor iron, W. R. Madison, 654,014; Apparatus for removing and applying various devices, E. H. Marshall, 653,775; Ash pan and sifter combined, E. Lundquist, 653,871; Atomizer pocket, S. Heiman, 653,866; Axle lubricating device, J. Seiter, 653,922; Back pedaling brake, A. Culbert, 654,053; Bale stax, Lowry & Holmes, 653,748; Bates, machine for unwinding cylindrical cotton, L. A. Aumann, 654,086; Baling press, T. E. & S. R. Sikes, 653,757; Baling press, J. J. Stopple, 653,709; Barrel hoop, metal, B. Shuster, 653,705; Barrel washing apparatus, G. Schock, 653,821; Battery, See Electro galvanic battery, Galvanic battery, Secondary battery; Bedstead reversible rail, W. R. McLain, 653,753; Bell and burglar alarm, combined door, H. A. Higbee, 653,999; Belt, cloth, M. J. 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