the medium of which a game of shooting matches may be played. A tilting chute is provided, adapted to hold a ball which is to be delivered upon a tray. A gun is provided for the tray, the charge of which gun is to be fired at the ball while it is traversing the board.

WINDOW-CLEANER. — LEWIS COCHRANE and FRIEDRICH THIELEMANN, Brooklyn, New York city. This device consists essentially of a tubular arm, which is slotted throughout the greater portion of its length and contains a slide provided with an arm passing through the slot and carrying outside the tube a device adapted to hold a sponge or rag by which the window-pane is cleaned. This slide is connected with the end of a spring band or bar which projects from the inner lower ends of the arm, where it may be engaged to move the slide up and down in the arm. The device can be used to clean the outside of a window from the inside of a room.

CHRONOMETER-ESCAPEMENT. — ARTHUR V. CHARDON, Rue de Bretagne 23, Paris, France. In detent-escapements as now used, the flank of the tooth of the escapement-wheel which drives the balance-wheel is straight and radially inclined. The result is that between the moments when the tooth meets and leaves the driving stud, there is a sliding movement of the stud on the tooth, which results in bad driving. To obviate this, the inventor has devised an escapement-wheel of which the tooth has a curve formed so as to reduce friction at the part where it acts on the stud.

BEVEL SQUARE.—SPENCER F. BROWN and CHARLES BEAUCHÊNE, Lake Linden, Mich. This invention provides a try and miter square, by means of which a miter may be delineated and a straight cut indicated at the top or bottom and at the side of an object, and marked with a single stroke of a marking-tool. Two square sections are rigidly joined together, one of the sections having a slot in which portions of a miter-plate fit. The miter plate is mounted on a bolt fitted in the square, whereby movement of the miter-plate is permitted. Means are provided for locking the miter-plate on the square.

TYPE-CASE.—CHARLES J. BOTZ, Sedalia, Mo. The type-case has a number of obliquely-arranged boxes adapted to hold type. When a box is full, a storage-box is slid in the frame of the type-case to receive the type from the full box. The storage-box, after having been filled, is removed, and the empty box is ready to receive another charge. The manipulation of the apparatus is simple, its capacity unlimited owing to the use of storage-boxes, and type may be distributed with great ease and rapidity.

CLAMP.—WILLIAM H. SHEELEY, 156 Fifth Avenue, Manhattan, New York city. It is the common practice to attach temporary blocks to mitered casings that are to be glued together, so as to give a bearing surface for the handscrews used to hold the parts together while being glued. It is the object of the present invention to correct the faults of this method. This end is attained by means of a miter-clamp, the frame of which has flanges projecting from one side and extending at an angle with each other corresponding with the angle of the miter-joint. One of the flanges is a skeleton-flange; and in this skeleton-flange a block is moved toward and from the other flange by means of a cam. A friction-roller is journaled upon the sliding-block and is engaged by the eccentric. A projecting arm upon the block engages the opposite side of the cam to withdraw the block.

SPOOLING DEVICE FOR SEWING-MACHINES.—CAROLINE C. M. WAGNER, Hamburg, Germany. By this attachment a separate spooling-device, such as is used in lace-making, is rendered unnecessary and the spooling is greatly accelerated by reason of the greater number of revolutions obtainable with the sewing-machine. The attachment consists of a bobbin which is held in an adjustable sleeve driven by a friction-wheel engaging the hand-wheel of the machine.

FIREPLACE.—CASSIUS B. NAY, Fairmont, W. Va. To provide a simple construction by which to prevent the escape of fire or smoke at the top or sides of the front, is the purpose of this invention. With this end in view, a fire-front is used comprising a front plate provided with inwardly-projected side flanges and with benches projecting beyond the adjacent faces of the side flanges and adapted to receive the side linings of brick.

APPARATUS FOR HANDLING COAL.—WILLIAM H. WALL, Nanaimo, Canada. The apparatus comprises a frame or platform with supply and dumping tracks at intervals of which are openings. The platform has a series of chutes lying below the dumping-tracks. To transfer the coal-cars from the supply-track to the dumping-track, a carriage is used. Tilting gripping-dogs move the cars along the tracks and are operated by cylinders and pistons; and valves and operating means control the passage of pressure to the cylinders. The apparatus is designed for loading vessels and transfer-cars with coal.

RUDDER-FRAME AND GEAR FOR SHIPS.—FRANK S. CORMIER, Moncton, New Brunswick, Canada. This invention is designed for temporary use on ships, and is attached to a vessel when the rudder has been broken away or injured. The temporary steering device comprises a cage-like rudder frame to the front of which a strut-brace is hinged, having a forked forward end fitting on each side of the stern-post. A rudder is hinged to the rudder-frame; and a series of guys hold the rudder-frame and brace in place and turn the rudder.

Designs.

PAPER-BOX BLANK. — EDWARD E. PINKERTON, Sioux City, Iowa. The leading feature of the design consists of a center-piece, slotted sides, and ends having divided tongues.

TELEPHONE-RECEIVER CAP.—HENRY R. COOL, Urbana, Ohio. The design provides a novel arrangement of earpiece whereby it is said the holding of the telephone is rendered less fatiguing than usual, and the sound is improved.

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.

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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.

(7700) H. Y. N. asks: Are buildings covered with iron or steel roofs more or less liable to be struck by lightning? Are instances on record of buildings so protected being struck? A. We suppose that an iron roof upon a building would render it more liable to be struck by lightning. We have no instances to cite in support of our opinion.

(7701) W. A. M. writes: 1. Suppose I compress air with an ordinary air pump direct into storage tank, maintaining a constant pressure of 80 pounds. What power would that air generate if used at once in a cylinder 7 inches by 18 inches? A. About 50 per cent of the power used in compressing air may be returned by immediate use of the compressed air. 2. What would be the minimum sized tank that would insure full power for one stroke of cylinder piston full length? A. The size of the tank is of little value, except as an equalizer for the strokes of the compressor piston, to catch condensed moisture and as storage for special uses. It may be from five to ten times the capacity of the compressor cylinder. 3. Would it be advisable to use a water jacketed air pump or air compressor, or would not the air heated by compression be more powerful when used at once, and less expensive to install the plant? A. For 80 pounds pressure, the temperature of the air will rise from 60° to 433° Fah., which is too high for economy in operating the compressor. The high temperature will not conduce to the best conditions in the press. 4. It is proposed to compress air with an ordinary air pump 2½ inches by 6 inches cylinder, running at 30 strokes per minute, into a tank 16 inches by 60 inches. The air compressed to 80 pounds would be used in the cylinder above mentioned, 7 inches by 18 inches, for one stroke only, one in every two minutes. Would this proposition be feasible? And would the power exerted be quick or slow? For the full length of the stroke, 18 inches? A. Your compressor or air pump should be three times larger in capacity or run three times faster than stated, in order to fill the press every two minutes at 80 pounds pressure. Six and one-third volumes of free air is required to make one volume at 80 pounds pressure. The transfer of air power is quick, and your arrangement is feasible.

(7702) P. C. T. asks: Can you give me a formula or formulæ for producing cold by the mixing of chemicals? A. There are many substances which produce a fall of temperature when they are dissolved. We give several formulæ. All parts are by weight.

1.	Snow	3 parts.
	Crystallized chloride of calcium	4 "
This will freeze mercury.		
2.	Water	1 "
	Nitrate of ammonia	1 "
3.	Sal ammoniac	5 "
	Nitrate of potash	5 "
	Sulphate of soda	8 "
	Water	16 "
4.	Sulphate of soda	8 "
	Hydrochloric acid	5 "

The nitrate of ammonia and water as above are the chemicals used by the makers of portable freezing machines. In the liquefaction of nitrate of ammonia a large amount of the heat of the water becomes latent when the temperature falls to near zero Fah. The machine may be simply a large pail or can with a cover, a smaller can sitting inside containing water or other material to be frozen or cooled. Water as cold as can be obtained is poured into the outer chamber and an equal quantity of nitrate of ammonia put into the water in the outer chamber in several portions with a small scoop

NEW BOOKS, ETC.

ELECTROTYPING. A Practical Treatise on the Art of Electrotyping by the Latest Well Known Methods. By C. S. Partridge. Chicago: The Inland Printer Company. 1899. Pp. 149. 16mo. Price $1.50.

The literature of electrotyping, though quite considerable, is not up to date, and for this reason electrotypers will undoubtedly warmly welcome Mr. Partridge's book. It is a thoroughly scientific treatise on electrotyping as conducted in modern foundries, and the illustrations of the apparatus and machinery show that the latest methods are described. There is considerable field for a book of this kind at the present time.

HINTS ON AMALGAMATION AND THE GENERAL CARE OF GOLD MILLS. By W. J. Adams. Chicago: Modern Machinery Publishing Company. 1899. Illustrated. Pp. 111. Price $1.50.

CHIMNEY DESIGN AND THEORY. A Book for Engineers and Architects. By William Wallace Christie. New York: D. Van Nostrand Company. 1899. Pp. 164. 8vo. Price $3.

The literature upon chimneys has been mostly scattered through periodical literature, so that a really comprehensive and up-to-date work upon the subject has long been needed. The author has performed his task admirably, and the tables, formulas, and illustrations are most excellent. We do not admire the abbreviation "illus." for illustrations. There is no authority for it, but this is, however, a detail. It is a substantial addition to engineering literature, and the author has performed a signal service to the engineering profession in giving such valuable data in condensed form.

ENERGY AND HEAT. By John Roger. New York: Spon & Chamberlain. 1899. Pp. 36. 16mo. Price 50 cents. Supplement to the same, 25 cents.

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