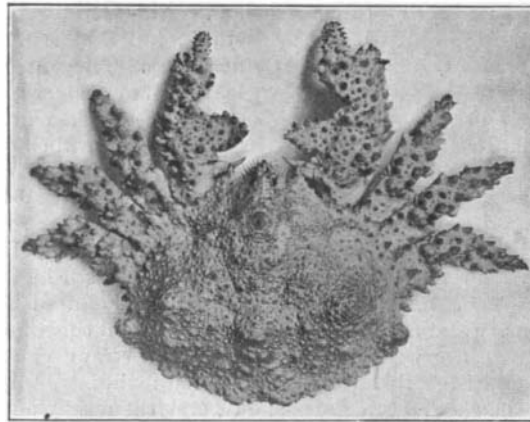


have had the opportunity of inspecting the operation of the door, and it impresses us as being an admirable solution of this difficult and most vital problem. Briefly stated, the absolutely essential elements of a successful watertight door system are first that every door may be closed simultaneously and instantly from the bridge or some central station, and that some telltale announcement shall show that they are closed; secondly, that it shall be possible to raise and lower each door independently, and from either side of the door, without conflicting with the operation from the bridge; thirdly, that it shall be possible to close the door either against a rush of water or through coal which may have accumulated in the doorway. These features, with others of minor importance, are all fulfilled in the present instance. The clear opening of the door can be of any desired size; for coal bunkers as shown in our engravings, it is generally about 4 feet 6 inches by 2 feet. The door is a steel plate riveted to a sliding frame. The guide-frame of bronze is bolted to the bulkhead, the guides being tapered $\frac{1}{10}$ of an inch to the foot. The sliding-frame is made with eleven wedges of the same taper as the guides, there being four on each side, two on top and one on the bottom. The surfaces nearest the bulkhead of both the guide-frame and the sliding-frame are scraped surfaces which form a water-tight joint by the wedge action which occurs during the last half-inch of closing. The guide-frame is open at the lower edge to prevent clogging or jamming.

The door plate carries a bronze rack into which gears a pinion keyed to a horizontal shaft which is carried at the top of the guide-frame. This pinion engages a smaller pinion on a second horizontal shaft, at either end of which is keyed a worm wheel, which in its turn engages a worm. The worm-shaft passes normally through the bulkhead and is driven by a one horse power electric motor, which is carried in a watertight casing on the opposite side of the bulkhead. Crank shafts are provided, which slip over the hexagonal end of the worm-shaft on either side of the bulkhead, and may be used for hand operation of the doors. The motor is compound-wound and of the short shunt type, the short shunt coils being relatively weak and wound outside the series coils. The circuits are so arranged that for raising the door only, the series coils are in circuit, giving a quick and easy starting; while for closing the door, where it may be necessary to cut through coal or other obstructions, the shunt and series coils are both in circuit. The current is controlled by a three-point spring lever switch on each side of the bulkhead. The switch is normally in its central position, in which the door closing circuit may be completed from the bridge or from any central station in the ship. The door-opening circuit can be completed only at the door, and this is done by moving the lever to the right or left, operations which raise or lower the door.

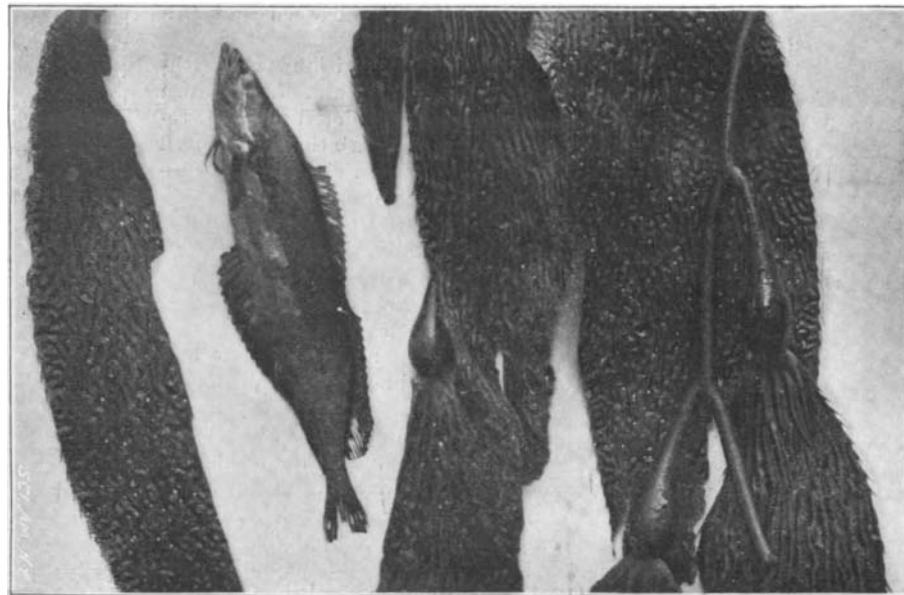
The operation of this system is as follows: In case of an emergency such as a collision, the officer on the bridge can immediately close every water-tight door throughout the vessel, a small signal lamp at the bridge, or other selected station, lighting up during the movement of the door and going out as soon as the door is closed. If any of the crew should be shut in a water-tight compartment, or should it be necessary to pass from one compartment to another after the doors have been closed from the central station, all that is necessary is to turn the spring lever at the particular door, when it will open, the lever returning to the central position and closing the door automatically when the person has passed through. Mechanically considered, the

door is an excellent piece of work both in design and construction. Judging from its operation as now installed on the "Atlanta," it appears to admir-



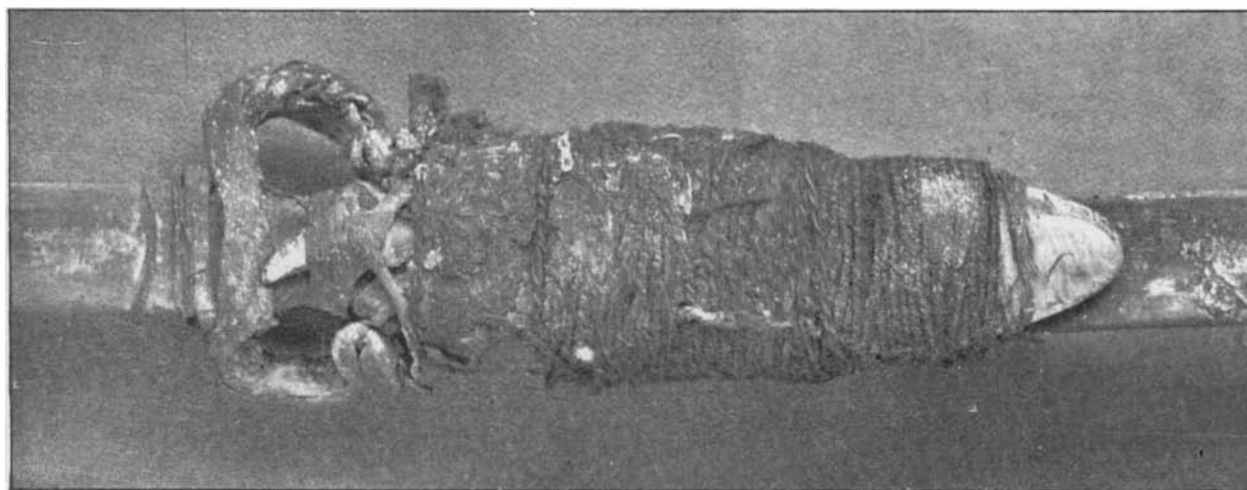
STONE CRABS THAT RESEMBLE ROCKS.

ably fulfill the requirements of a perfect water-tight door installation. We understand that Mr. Bowles' system will probably be exhibited at the Paris Exposition, where, by the way, the valuable Pollok prize is to be

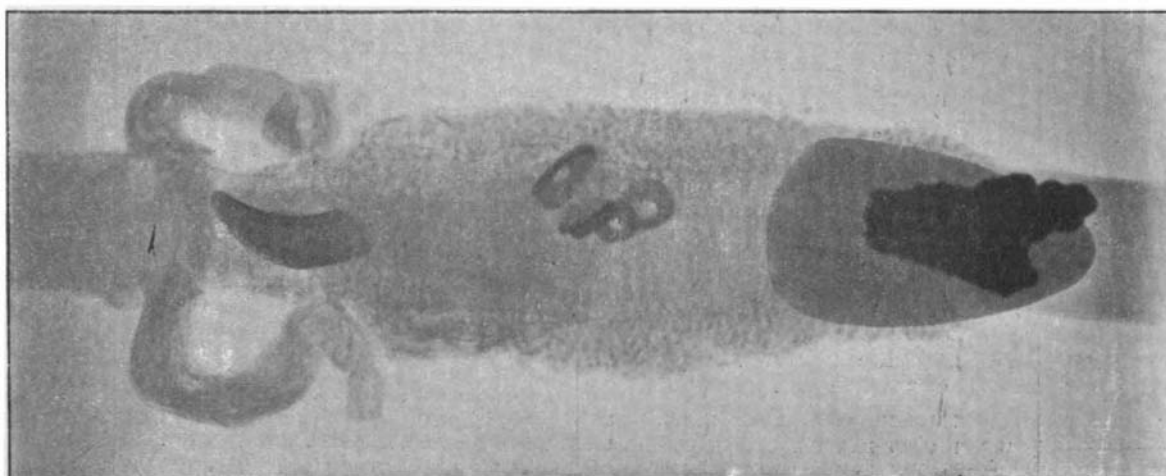


KELP FISH (*Heterostichus rostratus*), SHOWING ITS VERTICAL POSITION IN THE TANK, MIMICKING THE KELP IN SHAPE AND COLOR.

awarded for the best marine life-saving device submitted. Fuller details regarding the system can be gathered from a paper read by Assistant Naval Constructor Watt at the recent meeting of the Society of Naval Architects and Marine Engineers, and published in the Proceedings.



Finger Loops with Wrappings and Fetiches of Throwing Stick, from Cliff Dwelling, Mancos Canyon, Colorado.



Radiograph Shows Inclosed Stone Beads Concealed by Wrapping
AN ARCHÆOLOGICAL USE OF THE ROENTGEN RAYS FOR THE EXAMINATION OF A THROWING STICK.

Such is the "Atlanta" as she will appear when leaving the navy yard for her trial trip. The renovation and reconstruction have been so admirably planned and carried out, that except for the fact that she possesses only a partial armored deck, this vessel will now be well up to the standard of modern cruisers of her class.

ARCHÆOLOGICAL APPLICATION OF THE ROENTGEN RAYS.

Shortly after the announcement of the discovery of the Roentgen rays, Prof. Stewart Culin, of the Free Museum of Science and Art of the University of Pennsylvania, foresaw the possible future of the new rays in examining the internal construction of valuable museum specimens. After suitable apparatus had been installed in the Pepper Clinical Laboratory by Dr. Charles Lester Leonard, an attempt was made to test the practical application of its value in archæological work. Dr. Leonard made a successful radiograph of a Peruvian mummy, and the photograph disclosed the fact that the closely wrapped bundle contained the skeleton of a child having a string of stones or shell beads about its neck. Another radiograph was obtained of a desiccated human foot with a leather sandal. This gave promise of the utility of such pictures in the examination of such objects. Mr. Cushing expressed the opinion to Prof. Culin that a piece of turquoise was concealed beneath the heavy wrapping of brown yarn that binds the finger loops of every fine prehistoric throwing stick from Mancos Cañon, Col., in the University Museum. Mr. Cushing was of the opinion that the turquoise was the heart of a fetish bird. It occurred to Prof. Culin that the verification of this conjecture might be secured, and photographs of the wrappings with corresponding radiographs were made, with the result as shown in our engravings, which we are enabled to present through the courtesy of Prof. Culin.

It will be seen that four stone beads, presumably of turquoise, are revealed as Mr. Cushing had surmised. The extreme fragility of the wrapping was such as to render an examination by other means impossible without serious injury to a most valuable specimen. In the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT appears Prof. Culin's article, accompanied by additional side views of the specimen.

MIMICRY OF THE KELP FISH.
BY CHARLES FREDERIC HOLDER, PASADENA, CAL.

It is said of certain natives of South Africa that when they go into battle they carry bushes in their hands and move so slowly along that it is almost impossible to distinguish them from the mass of verdure about them. When an American warship is about to begin an engagement she is painted lead color, the object being to make her simulate the color of her immediate environment. Even the men behind exposed guns on the cruisers during the late war were ordered to paint their clothes the prevailing hue, so that the sharpshooters of the enemy would not pick them off.

This is called mimicry; the subjects imitating their surroundings as a protective measure; and that man has obtained the suggestion from nature is evident to any one who has made even a superficial study of the subject, as in every branch of animal life some forms are found which protect themselves from enemies in the manner described, namely, by imitating more or less their surroundings.

This singular mimicry is exhibited in a particularly interesting manner among fishes, and the accompanying illustration shows one

of the most interesting mimetic fishes common to the Southern Californian islands. It is generally known as the kelp fish, a most appropriate name, as the fish makes its home in the kelp beds which constitute the real protection of the Pacific coast.

The writer first observed the fish alive when drifting over the kelp beds in eight or ten feet of water. Then it was occasionally seen poised among the dark green weeds, presenting a beautiful appearance in a garb of vivid olivegreen, its long slender form undulating, as it were, in the current, a picture of grace. The largest specimen observed at Santa Catalina was a foot in length. The body was slender, the head pointed, eyes prominent. Along the back was a continuous frill, formed by a long dorsal, while opposite, the anal fin was an equally effective ornament. The fishes varied much in color. One observed was amber; others were orange or a vivid green, while others again were olive hued and some dark green above and below yellow and green combined.

Nearly all the specimens observed were lying in the kelp beds or in some large-leaved alga, and with difficulty could be seen by those in the boat who were not familiar with the fish. The fish was a marvelous mimic of its surroundings, and affected the kelp leaves that bore a close resemblance to its body and consequently afforded it protection. Its shape corresponded to that of the smaller leaves of macrocystis, the dorsal and anal fins giving it the ruffled appearance that is a feature of these leaves. All these fishes were observed through the windows of the glass-bottomed boat—a craft peculiar to Avalon Bay; a boat in the bottom of which four or six plates of heavy glass have been placed, a well rising into which the voyager looks, observing the bottom clearly, and all the objects slightly magnified.

The peculiar positions of the fish attracted attention, and when the tanks of the Zoological Station were available, a number of specimens were placed in them for observation. The feature that most interested the average observer was that, apparently, the fish could turn its head; this impression being gained from the fact that the fish swam in a laterally undulatory motion that was the personification of grace, and invariably poised in some odd or strange position. When placed in a tank by itself, a fish would at once manifest its uneasiness, swimming about, rubbing its tender lips against the glass and whipping its tail against it, with a result that it was soon disabled and died. The fishes so placed seemed to appreciate the fact that they were conspicuous objects and so liable to attack. Some individuals were so alarmed that they repeatedly leaped from the tank, and others in various ways displayed their fright.

The writer prepared a tank, or furnished it, to imi-

tate as nearly as possible the natural surroundings of the fish. The bottom was covered with a rich green ulva, while along the surface was suspended a branch of macrocystis, so that the leaves depended into the water, as seen in the illustration. Three or four fishes were now released into this tank, individuals which before had displayed great uneasiness. They at once swam to the dependent kelp leaves that were remarkable imitations of themselves, and one pushed into a coil in a leaf and rested, its head up within a few inches of the surface. Another in a few moments hung head downward, while a third poised with head upward, as shown in the photograph, becoming so remarkable a mimic of the hanging leaves in shape and color that to all intents and purposes it had disappeared. The fishes immediately recognized their security and made no effort to escape from this tank.

So perfect was this disguise that few strangers could see the fishes that were not eighteen inches distant until they had been pointed out, and then they almost doubted the evidence of their eyes, the tint of the kelp being perfectly produced in the color scheme of the fish. When not disturbed they invariably made use of this instinctive mimicry as a protective measure, and that it is effective in the sea where they make their home there can be little doubt, as few predatory fishes could distinguish the mimic as it floated among the leaves, its body assuming various positions as it adapted itself to the current and the weed that constituted its protection.

The kelp beds which surround the islands of Southern California have an interesting fauna of their own of which this kelp fish can be considered the most remarkable member. Another is a crab that is painted so exactly the color of the kelp—a rich olive green—that it is never noticed unless it happens that the observer is looking at it and sees the olive-hued legs lifted slowly one by one. Usually the crab clings to the under side of the kelp in the deep tangles, but it is sometimes driven up by enemies and can be seen climbing over the surface of the leaves. One of these kelp crabs when taken from its native element and placed in a tank without kelp immediately displayed uneasiness and attempted to escape, evidently aware that it was a bright and conspicuous object, but when the kelp was introduced it crawled upon it and like the dissolving view seemed to melt away and disappear.

The crabs alone afford many remarkable examples of mimicry. One shown in the accompanying photograph is so perfect in its imitation of a rough stone that it is almost impossible to detect it. When alarmed it draws in its legs and becomes, to all intents and purposes, an inanimate rock. The writer kept several deep sea spider crabs in a tank for several months. They were dredged in water about 800 feet deep,

where, presumably, it was dark, and such an animal would hardly be seen. When one was taken from the net, it was apparently lifeless, and of a peculiar brown color, perfectly clean, not a suspicion of weed being attached to its shell. When placed in a tank in a bright light it rarely moved, and resembled a rock; even when moving, its legs turned so slowly that it could scarcely be termed locomotion. Yet this type of sluggish life had sufficient intelligence to recognize that it was now near the sunlight that it had never seen, and that, perforce, it was a conspicuous object and might, possibly, become the victim of some predatory fish, so it began to add seaweed to its back, after the manner of many of its shoal-water allies. But this was done in a very singular way; the weed was plucked, then passed to the mouth, and, finally, attached, not to the back, but to the point of the shell above the mouth, so that they fell over the latter like a fantastic umbrella or gorgeous plume, really making the crab more conspicuous, except when it threw itself back, as it did when it was startled, when the plume of seaweed would point nearly upward, and the crab would become a rock, with a tuft of weed growing on it, well calculated to deceive the most observing enemy.

The Current Supplement.

The current SUPPLEMENT, No. 1252, has many most interesting articles. "The Destruction of the Hypo-style Hall in Karnak" describes a recent accident which has robbed the great temple of considerable of its attractiveness. "Bacteria and Their Uses" is an article by A. Dinsmore. "The Electrical Plants of the Battleships 'Kearsarge' and 'Kentucky'" is by Naval Constructor J. J. Woodward, United States Navy. "Long-Span Bridges" is an address by Prof. W. H. Burr, and is elaborately illustrated. "Progress of Mechanic Arts in the Last Three-Quarters of a Century" is an important address by Dr. Coleman Sellers. "Effect of Weather on Every-Day Life" is an interesting article.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

LISTED-CORN CULTIVATOR.—JOSEPH M. TAGUE, Cambridge, Neb. The main frame of this cultivator is swiveled at its forward end on sled runners and has a wheel-supported rear end. A disk-carrying frame is pivotally mounted on the main frame. The driver's weight can be more or less thrown on the disk-carrying frame. The cultivator is capable of efficient adjustment and of being easily guided in the furrow by reason of the swiveling of the runners to the main frame. By pivotally mounting the disk-carrying frame on the main frame, the disks are enabled readily to pass over any obstacle in their way.

Bicycle Appliances.

SAIL-ATTACHMENT FOR BICYCLES.—RUDOLPH SORESEN, Ord, Neb. The sail-attachment comprises a mast carried by a support by which it is held in a plane below the rear axle. A brace for the upper end of the mast is arranged for attachment to the bicycle-frame. A sail is carried by the mast, and a sheet engages the boom of the sail. By means of a reel on the bicycle-frame, the sheet can be wound up and unwound. The sail can be easily applied or removed, and since it is supported below the axle, the bicycle is balanced and runs steadily.

Mechanical Devices.

WINDMILL.—CLOMER PREJEAN, Milton, La. The invention is an improvement in that class of windmills in which a series of blades or vanes are pivoted to a wheel arranged vertically and mounted upon a horizontal axis having an extension provided with an expansible rail or guide, the whole being mounted upon a stationary base, so as to revolve horizontally. The improvement relates specifically to the construction of the wheel proper, means for adjusting the pivoted blades or vanes to throw them into or out of the wind, and the construction of the tail, whereby it is adapted to be expanded or closed corresponding with the position of the blades or vanes forming part of the wheel.

WEIGHING AND MEASURING MACHINE.—AMUEL P. MACKAY, Ridgefield, Wash. The purpose of this invention is the provision of an apparatus for measuring and delivering a certain quantity of liquid, to which end the apparatus consists of a rocking tank having an outlet-valve actuated by the rocking movement of the tank and operating with certain mechanism for restoring the tank to upright position after the rocking and for controlling the supply of liquid to the tank. The apparatus may be actuated by a coin-controlled mechanism.

MACHINE FOR STEMMING AND CLEANING RAISINS.—CARY S. COX, Fresno, Cal. In this machine for stemming and cleaning raisins, a fixed and a

rotary screen are provided. A feed device is arranged to deliver the fruit between the two screens, and the fruit is subjected to currents of air. A cleaning mechanism is provided for the rotary screen, which is adapted to remove stems or other material that may lodge in the meshes of the rotary screen. The raisins are stemmed and cleaned without injury to the latter, and the dirt and dust, it will be observed, are removed and conducted from the machine through a medium independent of that employed for conducting the cleaned fruit.

PIPE-WRENCH.—ROBERT FJELLMAN, Wilmet, S. D. The device can be used both as a wrench and pipe-cutter. In its construction is included a handle, one end of which is toothed on one side to form a pipe-engaging surface and the opposite side formed with a transversely-extending concavity. A longitudinally-slotted yoke passes about the bar near the jaw, and a removable pin passes through the slots in the yoke and through the bar. A jaw projects from one end of the yoke parallel with the other jaw. A set-screw passes through the other end of the yoke and engages the bar or handle, whereby the separation of the jaws may be regulated. A cutter is adapted to be secured to the jaw upon the yoke.

WASHING-MACHINE.—JOHN H. GEERS, St. Louis, Mo. The machine comprises a body having a vertical rear wall provided with guides on its face. Plungers work in the guides and have their upper ends projecting above the rear wall of the body. Ponderers are rigidly secured to the lower ends of the plungers. A lever is pivoted at its center to the outer face of the rear wall of the body. Pitmen have their lower ends pivoted to the ends of the lever and their upper ends to the upper ends of the plungers. By oscillating the lever an alternate reciprocating movement is imparted to the plungers and their ponderers.

Railway Contrivances.

LUBRICATOR AND WIPER FOR LOCOMOTIVE AXLES.—JAMES S. PATTEN, Baltimore, Md. The usual means for conveying oil to the axle-journals is cotton-waste packed in the boxes, or "cellars" as they are called. From time to time this packing must be renewed, which can be effected by removing and replacing the cellar. The present invention utilizes the cellar, but avoids the necessity of its frequent removal. The lubricant is taken up, not by cotton waste, but by means of rollers, which, together with a yielding wiper whereby the oil is prevented from "creeping" along the journal, are contained in the "cellar" or box.

Miscellaneous Inventions.

VENTILATED BARREL.—JOHN S. WRIGHT, JR., Churchland, Va. This improved ventilated barrel is composed of an outer set of straight, parallel-sided staves whose ends are in contact, and an inner set of wedge-shaped staves, arranged with their narrow and

wider ends alternating, the wider ones overlapping the narrow outer staves, the width of the respective inner and outer staves at the middle being practically the same, and the staves of one set being placed flat against the other so that their middle portions coincide, and bent to form a ridge or convexity and produce the elongated coincident openings.

HAT-CASE OR VALISE.—NELLIE F. HURDEL, Manhattan, New York city. The hat-case consists of two similar parts hinged together, having secured in one side a longitudinal shaft, adapted to support a series of vertical, adjustable, hat-supporting arms arranged one above the other and provided with clamps. The shaft is hinged to one end of the case approximately near the hinge and provided on the other end with a lug to engage a recess in a spring on the opposite end of the case. The hat-case may be used in traveling-cases, shipping-boxes, and show-cases, or in closets and wardrobes.

SASH-FASTENER.—ALEXANDER FORIN, Nelson, British Columbia, Canada. It is the object of this invention to provide a fastener which will operate to secure the sashes in closed position and also hold them at different elevations. The fastener comprises a bearing in the window-jamb at a point above the lower sash when it is closed. A pawl is rotatably mounted in the bearing and normally engages the lower sash when the latter is raised, and is of such length that when turned down or reversed into vertical position its free point will abut against the mid-rail of the lower sash, so as to fasten the sash in closed position.

STOVE OR OVEN-DOOR LIFTER.—MATHIAS WEIXLER, Louisville, Ky. It is the object of this invention to provide the doors of stove-ovens and furnaces with an attachment for holding them closed and for assisting in closing them. The main feature of the invention is found in a coiled torsion spring so arranged as to perform its natural function as well as to serve as a handle for opening the door. The spring so operates as to prevent slamming either in opening or closing.

SEWING-MACHINE SHUTTLE.—PERCY H. HEWITT, EDWIN A. COCKLE, and CHARLES MATTHEWS, Oakley House, Spring Grove, Isleworth, London, W., England. The sewing-machine shuttle is open at the heel end, into which a removable cap fits. The cap and shuttle are provided one with a pin and the other with a locking-slot, the inner end of the slot trending backward or toward the edge of the member containing it, so that the cap must be moved inward to release it. The trend of the spring is transmitted to the cap through the spool. By this construction the disadvantages of complexity and expense are avoided.

WINDOW-BRACKET FOR CLOTHES-LINES.—JOHN G. VON HOFE, Manhattan, New York city. To provide a device by means of which clothes can be easily hung upon a line without the necessity of the person's leaning out of the window, this inventor has devised a clothes-line bracket pivoted at one side of the

window and provided with means for securing the line to its outer end. A bar is pivoted to the outer end of the bar and is adapted to engage the inner side of the window-sash. A detachable bar connects and holds the swinging bar and the bracket from each other.

PROCESS OF UNHAIRING SKINS AND TRANSFERRING FUR, FEATHERS, HAIR, ETC., TO ARTIFICIAL BACKINGS.—JOSEPH A. MALAISÉ, Avenue de la République 45, Paris, France. The hitherto-employed methods for unhairing skins are objectionable, because the hair is often incompletely removed, while the depilatory medium being immediately in contact with the grain side (the finest part of the leather), injures the leather and causes it to lose its fineness. To overcome these objections, the inventor first applies to the hair side a coating of a substance to hold the hairs, then to the flesh side a substance serving to penetrate the skin to facilitate removal of the hairs. The hairs are removed and the roots coated with rubber. A backing is embedded in rubber, and the backing is connected with the rubber-coated face of the substance holding the hairs. The substance in which the hairs are embedded is then removed.

WINDOW-SASH.—GEORGE T. SOPER, Far Rockaway, Queens, New York city. The sash is especially adapted for coach and carriage use and is so constructed that the covering will be preserved to a maximum extent and prevented from becoming loosened from the sash. The sash is furthermore so constructed that it will be prevented from rattling, so that even should it shake in the sashways, no noise will be produced.

WIRE BROILING-PAN.—THOMAS F. COONEY, Verplanck, N. Y. The invention provides a skeleton, pan-like dish provided with a handle and constructed of wires which are bent so as to form the outline of the device and secured together by having certain portions bent about other portions. A broiler is thus produced which may be set into the stove, being supported upon the stove-top and which may be covered to prevent the spattering of fat.

Designs.

CLOTHES-SPRING.—JAMES N. CARTER, McKinney, Texas. This clothes-spring is made of a coiled wire having its terminals in the form of side arms with loop-like handles. The device is noteworthy for its great superiority over the old-fashioned clothes-pin and for the simplicity and cheapness of its construction.

WALL-PAPER.—HARRY WEARNE, Rixheim, Germany. Four designs have been issued to this inventor for wall-papers, in which flowers and vines are combined in various forms to produce a pleasing and artistic effect.

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.