

THE LAST OF A FAMOUS "AMERICA" CUP CHALLENGER.

Of all the English yachts which have come over to compete for the "America's Cup," there is probably none that has made such a good record for herself as the fine old English cutter "Genesta,"; certainly, she came nearer winning the cup than any yacht that preceded her or came after. The American yachting enthusiast who was so fortunate as to be present at that famous race in 1885 of twenty miles to leeward and return, will not soon forget the anxiety with which he saw Sir Richard Sutton's yacht slipping down the wind to the outer mark with an ever-widening distance between her and the centerboard "Puritan," nor the delight with which, when the boats hauled on the wind he saw the center board slowly, but steadily, out-weathering the cutter, and finally romping home the winner by the close but undeniable margin of 1 minute 38 seconds. In the light weather trial the shallow centerboard with her relatively large sail area proved to be a far faster boat than the "Genesta." Although she failed to take home the cup, "Genesta" was successful in winning both the Brenton Reef and Cape May cups.

The "Genesta" was a typical English deep-keel, outside-lead cutter of the so-called plank-on-edge type; though she was not so extreme in her relation of beam to draught as some cutters of her time, she was sent over here at a time when the "keel versus centerboard" controversy was at its height. In none of the races that have followed those of 1885 have the competing yachts of the two nations shown so strongly the distinguishing national characteristics as did "Puritan" and "Genesta," the one being distinguished by narrow beam, deep draught, outside ballast, large displacement and relatively small sail plan; the other by great beam, shallow draught, and both inside and outside ballast, the outside ballast being the first step toward the cutter type, just as the English "Thistle" in adopting a beam of 20 feet showed the first tendency toward the characteristic beam of the American sloop.

The "Genesta" was a composite built boat (elm planking on steel frames), and measured 96 feet on deck, 81 feet on the waterline, 15 feet beam, and 13 feet 6 inches draught. She had a displacement of 141 tons and a sail area of 7,141 square feet. The "Puritan" was 93 feet on deck, 81 feet 1 1/2 inches on the waterline, 22 feet 7 inches beam, 8 feet 10 inches draught, with a displacement of only 105 1/2 tons and a sail area of 7,370 square feet.

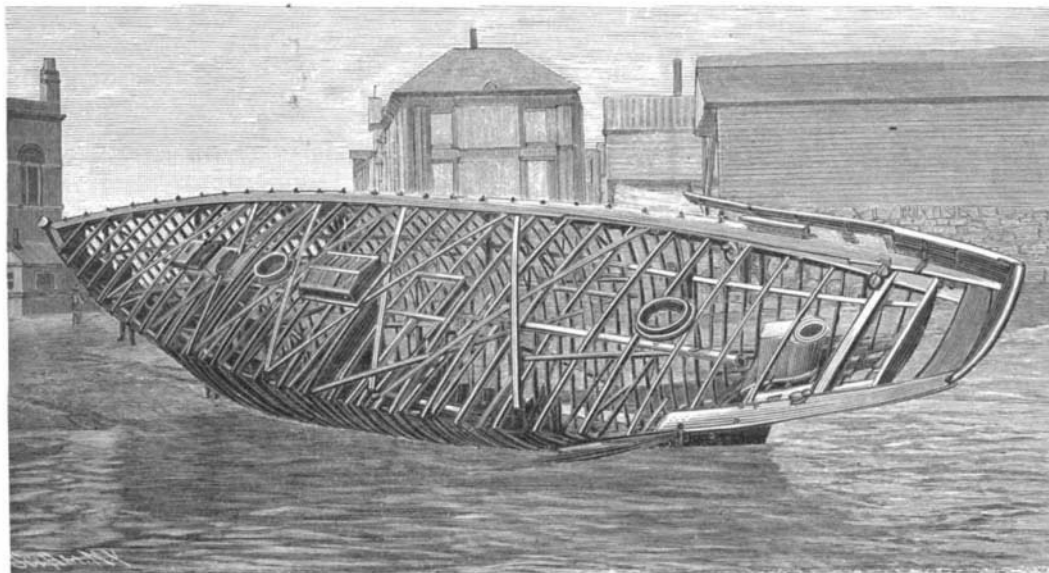
The accompanying illustration, for which we are indebted to The Yachtsman, shows the famous old cutter upon the beach in process of being broken up for old iron and junk, an inglorious end that overtakes all craft except a few favored warships like our own "Hartford," or Nelson's old ship, the "Victory."

THE FIRST-CLASS BATTLESHIP "ALABAMA"

The "Alabama," whose record of 17 knots an hour on her recent official trip, places her at the front rank of our battleships for speed, will always be a vessel of particular interest, from the fact that in her we see the introduction of a new type in the United States Navy. Comparing her with the "Oregon," the "Iowa," or the "Kearsarge," the most noticeable difference is the entire absence of the 8-inch gun. Hitherto our battleships have been distinguished from those of other navies largely by the fact that they carried a much heavier armament, due chiefly to the presence on board of a complete battery of guns which were intermediate in power between the main battery of 12-inch and 13-inch guns, and the secondary battery of rapid-fire guns of 5-inch and 6-inch caliber. The battleships of Great Britain, France, and Germany, and with a few exceptions, of Russia, have carried no guns of a caliber between the 12-inch and the 6-inch weapons, and in the "Alabama" we see the first disposition on the part of our naval constructors to follow the European practice. Although the absence of the 8-inch gun is very sincerely regretted by most of our officers of the line, it cannot

be denied that in the "Alabama" the heavy secondary battery of 6-inch guns, on account of its rapidity of fire and the enormous weight of metal which can be thrown in a specified time, goes far to offset the removal of the very popular 8-inch breech-loading rifle.

The "Alabama" was authorized June 10, 1896; the contract for her construction by the William Cramp & Sons Ship and Engine Building Company was signed the following September; the keel was laid the December of the same year, and the vessel was launched on



PRESENT APPEARANCE OF THE FAMOUS CUP CHALLENGER "GENESTA."

May 18, 1898, and has now been completed about eleven months later than the contract date, this delay being due to the failure of the builders, on account of the armor-plate controversy, to receive the necessary armor during the construction of the ship. The vessel is 360 feet long, 72 feet 2 1/2 inches broad, and has a mean draught, when fully equipped for sea, and with 800 tons of coal on board, of 23 feet 6 inches. Her displacement on the draught given is 11,565 tons. She is driven by twin-screw, vertical, triple-expansion engines, and steam is supplied by boilers of the Scotch type. Her normal coal supply is 800 tons and her bunker capacity with nominal loose stowage is 1,200 tons, while with close stowage she can hold 1,440 tons in the bunkers. As compared with the "Kentucky" and "Kearsarge" she has about 8 feet more freeboard, due to a spar deck which extends from the bow about two-thirds of the way out. Her protection consists of a belt of Harveyized armor of a maximum thickness of 16 1/2 inches, which tapers toward the bow and stern. Above the belt, amidships, side armor of 6 inches is

In various articles on naval matters which have appeared from time to time in the SCIENTIFIC AMERICAN we have described and illustrated, with sectional views, the structural features of the barbette of a modern warship; but we think that the most knowing of the naval "sharps" among our readers will be able to learn something from the accompanying illustration showing the interior of a barbette before the turret was installed. The photograph from which our plate was made is one of a series of progress photographs which were filed with the Chief Constructor of the Navy during the construction of the "Alabama." It was taken from the after end of the superstructure, the deck upon which the people around the edge of the barbette are standing being the main deck.

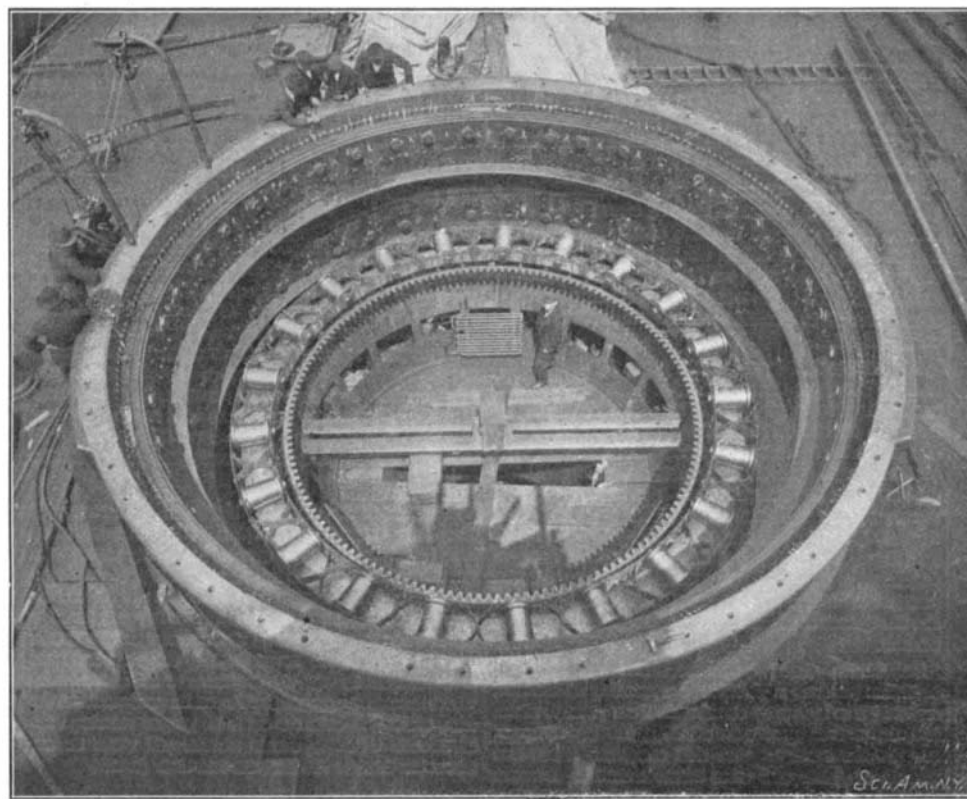
The barbette is a vertical, cylindrical, heavily armored redoubt, which extends from the protective deck to a height of 3 feet 8 inches above the main deck. The duty of this redoubt is to protect the unarmored base of the turret, the mechanism by which it is rotated, and the hoist by which the ammunition is brought up to the guns. Within this cylinder, which is about 12 1/2 feet in depth, is located a circular track upon which is a circle of twenty-one conical rollers, which are held in their proper spacing and radial position by means of two concentric rings, firmly braced together.

Upon these rollers is carried the whole weight of the turret, the guns and their mounts, a total of 277 tons. The lower half of the turret is in the form of a circular-inverted cone and is unarmored; the upper and armored portion of the turret is elliptical in plan, and the rear portion of it projects over the top edge of the barbette, enough space being left between the turret and barbette for easy clearance in turning.

The barbette is protected for two-thirds of its circumference with 14 inches of Harveyized armor, the remaining one-third, or the portion which is nearest to the point of view from which the photograph was taken, is protected with 10 inches of armor, less protection being needed on this portion of the barbette because it is screened by the 6-inch side armor on the hull of the vessel. The armor is bolted to a backing of teak, within which is 1 inch of steel plating attached to a heavy framing of steel beams, angles, and channel beams. The internal diameter of the barbette is 27 feet.

Immediately within and below the circle of rollers is seen the massive circular rack which forms part of the turning mechanism of the turret, rotation being effected by means of two electric motors carried in the base of the turret. The shafts of these motors are connected by suitable gearing with pinions which engage the circular rack; and the training of the great weight of the turret and guns is accomplished with a speed and accuracy which are impossible when hydraulic, compressed air, or steam motors are used.

The after barbette of the "Alabama" contains altogether 26 tons of armor. The total weight of the installment, including turrets and guns, is 783 tons. The forward barbette and turret, however, are much heavier, the total weight in this case being 978 tons. This increase is due to the fact that the "Alabama" carries her forward guns above the spar deck, and, therefore, some 7 1/2 feet to 8 feet higher above the waterline than the after pair of guns, the increase in weight being due entirely to the increased height of the barbette.



INTERIOR OF THE BARBETTE OF THE FIRST-CLASS BATTLESHIP "ALABAMA."

carried up to inclose and protect the guns of the secondary battery. The main battery of four 13-inch guns is carried in elliptical balanced turrets which have 14 inches of armor protection. The secondary battery is extremely powerful and consists of fourteen 6-inch rapid-fire guns, twelve of which are carried on the main deck and two on the boat deck amidships. She is also armored with sixteen 6-pounders, six 1-pounders, four Colts, and two 3-inch field guns. She is fitted with four tubes for the discharge of Whitehead torpedoes.

PROF. HENRY F. OSBORN has been appointed to succeed the late Prof. O. C. Marsh as palaeontologist of the United States Geological Survey. Prof. Osborn will have charge of the vertebrate palaeontology of the survey especially with reference to the completion of the monograph for which illustrations were prepared under the direction of Prof. Marsh.

SILVER BRONZE.—Melt equal parts of bismuth and tin and add an equal part (by weight) of mercury. It is sprinkled, finely powdered, upon the freshly sized or varnished surface.—*Pharmaceutisch Post.*

Science Notes.

The first-aid packages in South Africa have proved very valuable, and their use is recommended to railway employes, miners, and workers at other unusually perilous crafts.

By treatment with iodine and aniline pigments, H. Kraemer has determined that the alternate layers in a starch-grain are due to a substance rich in colloids but poor in crystalloids, alternating with a substance rich in crystalloids but poor in colloids. — Botanical Gazette.

Some specimens of the blind fish from the Mammoth Cave of Kentucky have recently been placed in the London Zoological Gardens. These fish have never before reached England alive, and it is supposed that only on one previous occasion have living specimens been exhibited in Europe, viz., in 1870. In that year five fishes were placed in a tank in the zoo at Dublin (Ireland), but they did not live very long, succumbing to a fungoid growth on their bodies.

A German syndicate has just made arrangements whereby it secures all the timber on a large strip of land in the mountains in eastern Kentucky. It is estimated that the strip contains about 800,000 of the finest specimens of oak trees. Foreign syndicates are investing heavily in eastern Kentucky, and especially in timber and mining interests. They own large tracts of the finest land, which will quadruple in value when railroads reach that section of the State.

The following abbreviations of metric units have been decided upon by the International Committee of Weights and Measures: Length: Kilometer, km.; meter, m.; decimeter, dm.; centimeter, cm.; millimeter, mm.; micron, μ . Surface: Square kilometer, km.²; hectare, ha.; are, a.; square meter, m.²; square decimeter, dm.²; square centimeter, cm.²; square millimeter, mm.². Volume: Cubic meter, m.³; stere, s.; cubic decimeter, dm.³; cubic centimeter, cm.³; cubic millimeter, mm.³. Capacity: Hectoliter, hl.; decaliter, dal.; liter, l.; deciliter, dl.; centiliter, cl.; milliliter, ml.; microliter, μ . Weight: Tonne, t.; quintal metrique, q.; kilogramme, kg.; gramme, g.; decigramme, dg.; centigramme, cg.; milligramme, mg.; microgramme, γ .

It was at one time believed that the oldest map was that known as the Peutingerian Table, which was supposed to be a product of the third century, says The Architect, but later inquiries show it to be no older than the twelfth century. It is now generally held that a still more ancient specimen of map-making is a mosaic in Madaba, Palestine. It formed a part of a Byzantine church, and was used as an adornment for the floor. Evidently the artist anticipated the pictorial cartographers of modern times, for an attempt has been made to suggest the character of some of the scenery in Palestine. Practically the greater part relates to that country, and the number of names which are given cannot fail to be useful to modern explorers.

Destruction by Dynamite.

It was reported from South Africa that the Boers recently attempted to destroy a railway tunnel by starting from the opposite ends two locomotives, heavily loaded with dynamite; but these locomotives collided at full speed midway in the tunnel, exploding the dynamite, and, of course, completely wrecking the engines; but (according to a later dispatch) the resultant injury to the tunnel itself was relatively small, and could be repaired easily and rapidly. According to another report, the official mining engineer of the Pretoria government, in charge of the Johannesburg gold mines, said that all the mines of the Witwatersrand could be destroyed in two days by the use of dynamite, if such a step should become necessary. The surrender of Johannesburg to the British, however, with the mines intact, disposed of all these reports of contemplated vandalism.

In view of the fact that a proposition to destroy the mines was made and actually discussed, I take occasion not to discuss the ethical aspects of this use of dynamite, as related to the laws of civilized warfare, but rather to point out that "destruction by dynamite" is not so easy as its projectors are accustomed to consider it. This statement, illustrated already by the experience of Anarchists, Fenians, strikers, and inexperienced miners, seems to have received its latest confirmation in the railroad tunnel mentioned above. The fact is, that when the impact of a dynamite explosion is communicated to a large body of air (as was the case in the great Johannesburg explosion five years ago), it may, through that medium, work widespread wreck; but when it is immediately received by solid masonry or rock, its energy is largely expended in the molecular work of local pulverization, being generated too instantaneously, and too simultaneously throughout the mass of the charge, to permit its seeking "lines of least resistance," or following such lines, once found, with the persistence due to a more gradual expansion, such as the slower, progressive explosion of black powder produces.

Thus, in one instance, when put under an obnoxious monument, dynamite dug a big hole in the ground, and pulverized the bottom stones of the monument, but did no further damage. In another case, exploded against the wall of a public edifice, it made a small opening in the immediate adjacent masonry—and that was all. In the recent railway road tunnel experiment of the Boers, the collision and the dynamite together doubtless made scrap iron of the two locomotives, and track ballast of a considerable amount of the rock in the immediate vicinity; but unless the locality of the explosion had been skillfully selected, with a view to collateral results, it is highly improbable that anything more than the clearing away of the rubbish (and, perhaps, some fresh support for walls and roof) would be required to make the tunnel commercially useful again.

The statement of the Transvaal engineer as to the

practicability of the "destruction" of a large number of mines in two days may be taken with much allowance. Unless very elaborate and extensive preparations had been already made, and made with much skill, his threat indicated either cheek or ignorance only. Even if such preparations had been made, the rapid and general destruction which he describes as practicable would be so only if innumerable separate and widely-scattered bore-holes, already charged with dynamite, were waiting only for the electric spark to fire them simultaneously. But no sane engineer would dare to create and maintain such a situation as that for more than a day.

The probability, amounting almost to certainty, is that such attempted "destruction" would amount to nothing more than the partial or total wreckage of machinery and buildings, and the production, here and there, of local and limited caving of ground. This would have caused, no doubt, delay and expense in the resumption of mining operations; but it would not by any means have extinguished the Witwatersrand as a source of gold for the use of the world.—Science and Art of Mining.

The English Admiralty have not yet concluded their experiments with the "Belleisle." The craft, which was riddled by the gun-fire of the "Majestic," is being patched up and will then be towed into Portsmouth Harbor and have her torpedoes exploded in her tubes. The Naval Department is desirous of ascertaining exactly what would be the result, if such an untoward accident as the premature explosion of the torpedo in its tube occurred during an actual engagement.

The Current Supplement.

The current SUPPLEMENT, No. 1288, is of unusual importance. "Germany's First Cable-Laying Steamer" is elaborately illustrated. "American Engineering Competition" deals with structural steel work. "Contemporary Electrical Science" is a series of short notes on electrical topics. "India Rubber at the Paris Exposition" is a valuable technical article. "The French Mission to Yunnan" is a profusely illustrated article. "Dairy Development in the United States" is a full article upon the subject.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

BAND-CUTTER AND FEEDER.—JOHN ERICKSON and JAMES MCC. EDMONDSON, Gardner, N. D. In this apparatus the grain-bearing straw is delivered vertically to the cylinder, dropping from the carrier to the cylinder a predetermined distance. Retarding devices engage the straw before it reaches the cylinder, thus giving ample opportunity for all loose grain to drop out from the bundle and be conducted to a suitable point without necessarily being passed between the cylinder and the concave. The machine is so constructed that the straw will spread before it strikes the cylinder, whereby the motion of the cylinder will distribute the straw more evenly and gradually than heretofore and will also prevent the slugging which invariably occurs when the straw is fed from directly in front of the cylinder.

HAY-RACK.—ALEXANDER FERGUSON, Odell, Ill. The purpose of the invention is to lessen the difficulty usually experienced in placing a hay-rack upon a wagon and running it therefrom, which is accomplished by making the rack in sections and providing fastening devices so constructed that the sections may be firmly locked together and readily separated, thus enabling the rack to be adjusted in sections upon the body or running-gear of a wagon in a convenient and expeditious way.

MOWING-MACHINE SEAT.—NATHAN BAUGHMAN, Hammersley Fork, Penn. In mowing-machines it is desirable that means be provided whereby the seat can be readily adjusted or rocked to secure the desired level position. The seat in this invention is pivotally supported so that it can be rocked from side to side and provided with a depending transverse rib or bearing extending on both sides of its pivot. A cam engages the rib on opposite sides of the pivot of the seat, so that it can rock the seat from side to side, but not tilt it from front to rear.

Mechanical Devices.

CENTRIFUGAL WATER-CLARIFIER.—FRANK H. RICHARDSON, Pueblo, Col. The device is designed to remove solid matter and impurities from water. The clarifier comprises a casing mounted to rotate relatively to a main or supply-pipe. Automatically-actuated valves permit the escape of separate material. The device is arranged in a well on the top of which are rollers engaged by the periphery of the casing to prevent vibration.

TOBACCO-SEPARATING MACHINE.—LUIS R. SCHOLTZ, Caracas, Venezuela. This machine is especially adapted to separate tobacco or picadura from the

wrappers of such cigarettes as are delivered from cigarette-making machines in a non-marketable condition, thus enabling the picadura to be again utilized. When thus used over again, the picadura is improved; for it is freed from dust. The machine is provided with means for collecting and retaining the tobacco-dust, which may be utilized in the manufacture of snuff.

FIRE-ESCAPE.—THOMAS T. BROWN, Euclid, Minn. In this fire-escape, a rope is used in connection with a friction device arranged to move relatively to the rope, so that a person attached to the friction device may descend gradually to the ground. The novel features of the invention are to be found in the construction of the friction-device so that it is rendered both durable and certain in action.

MARINE-DUMPING VESSEL.—FRANKLIN H. BULLIS, Brooklyn, New York city. The vessel is arranged to dump the load from the top instead of from the bottom and to insure a perfect discharge of all the mud, city refuse, or other matter forming the load. A single operator can manipulate and discharge the load with the greatest ease. On the deck of the vessel are two receptacles having their backs abutting and mounted to swing transversely in opposite directions from a loading to a dumping position and vice versa. By arranging the receptacles and their operating mechanism on the top of the hull, it is evident that they can be repaired at any time without requiring docking of the hull.

SAWMILL.—LEE W. DICKEY, Scottown, Ohio. The invention provides a peculiar construction of sawmill, enabling it to be readily transported from place to place, and a novel feed-gearing for effecting the proper movement of the carriage. The mill comprises a saw-box formed of joists and cross-beams extending between them at one end of the saw-box. Journals projecting inwardly from the joists at the other end of the saw-box are adapted to carry wheels on which to mount the rear portion of the saw-box. A reach is attached to the beams and projects forwardly to carry a wheeled axle to support the front of the saw-box so as to facilitate the transportation of the saw-box.

CHUCK.—ANDREW DINKEL, Auburn, N. Y. This chuck is particularly adapted for holding work, the center of which is to be bored—for example, for holding a gear while the hub is being bored. The inventor employs a number of radially-movable jaws which advance to grip the work and retract to release it, and which are acted upon by tangentially disposed links connected with a member which moves circularly with respect to the body of the chuck. The chuck is also fitted with a means of centering the drill, causing it properly to engage the work.

Railway Contrivances.

LOCOMOTIVE BUFFER-BEAM.—JAMES F. DUNN, Salt Lake City, Utah. The buffer-beam is cast in steel and so constructed that all its parts are comprised in an integral casting to which the proper parts of the engine may be directly attached. It is one of the purposes of the invention to protect the cylinder-heads, boiler-head, and adjacent vital parts of the locomotive in case of collision.

AUXILIARY CAR-MOVER.—PATRICK RYAN, Manhattan, New York city. The object of the device is to assist the motive power in propelling a car up grade when the tracks are slippery. On the inner side of each car-wheel an eccentric is fastened; and on the car-axle two eccentrics are secured. An eccentric strap is loosely mounted upon each eccentric on the car-wheels and on the axle. And upon each eccentric-strap a pusher-bar is secured. If the car-wheels slip, the pusher-bars, if resting with their free ends upon the road-bed, will successively push so as to coast with the regular motive power.

ELECTRIC RAILWAY SYSTEM.—GEORGE L. CAMPBELL, Manhattan, New York city. The invention is an improvement on a system previously patented by Mr. Campbell, in which a closed conduit is employed having a continuous main conductor and a sectional surface conductor. In the conduit a trolley is caused to travel with the car by the influence of a magnet on the car. In the present invention, Mr. Campbell has been concerned chiefly with the provision of an arrangement which insures the proper feeding of the current from the main conductor while the car is in proper running condition and instantly causes a dead rail when the car leaves the track or the magnets lose their power.

Miscellaneous Inventions.

APPAREL-COAT.—DANIEL MURPHY, 1307 E. Franklin Street, Richmond, Virginia. To avoid the dropping or the raising of the shirt-sleeve cuff from its proper position in the coat-sleeve, the inventor has designed a peculiar formation of the inner surface of the coat-sleeve and attached the cuff directly to it, instead of to the shirt-sleeve. This insures an invariable projection of the cuff below the coat-sleeve, and allows the cuffs to be put on or off with the coat. The coat-sleeve has buttons secured to the interior thereof, and fastened to the edges of the cuff. A flap fixed to the inner side of the sleeve above the buttons has buttonholes which register with the buttons, and are adapted to fold down over the upper edge of the cuff, and covering and retaining the cuff by being fastened to the buttons.

PROCESS OF TREATING GOLD AND SILVER ORES.—HENRY HIRSCHING, Salt Lake City, Utah. Mr. Hirsching's invention is a process for treating copper ores, principally to extract the cupric oxide, but also to obtain gold and silver from ores containing the oxide whether with or without copper. It consists in adding the small broken ore gradually under agitation to an ammoniated solution, diluting the solution, and separating it from the slimes. The slimes are washed separately and their residue heated to recover the ammonia therefrom. The process can be used to advantage and economy with refractory ores from which copper could not be profitably secured by melting and by other methods hitherto employed.

CURTAIN-POLE.—KATE R. BROADSTREET, Grenada, Miss. This curtain-pole consists of a tubular back-bar connected with a tubular front-bar. Each bar is provided with a guideway for curtain-hangers. When curtains are hung on this apparatus they can be shifted in various ways and reversed, crossing one another at the pole; or they can hang in the same horizontal plane, edge to edge, at the top or be bowed outwardly to produce a bow-window effect. The pole can be supported by ordinary brackets.

OIL-GAS LAMP.—ALBERT S. NEWBY, Kansas City, Mo. Two patents have been granted to Mr. Newby for lamps in which vaporized oil is used as the illuminant. In both lamps the burner is placed above the oil-reservoir, the oil being forced by air-pressure through a pipe leading above the burner, so that the flame can vaporize the oil. The feed of the oil is regulated by a needle-valve. In the one case a mantle is used; in the other an ordinary flame of high candle-power is produced. Both lamps are exceedingly efficient and are particularly serviceable for out-door use, since they cannot be blown out by any wind. The lamps are so constructed that they can be readily taken apart whenever it is desired to clean the parts.

Designs.

SKIRT-HANGER.—ARCHIE L. ROSS, Manhattan, New York city. This skirt-hanger is so designed that a number of skirts can be properly hung in a closet so that they will take up as little room as possible.

PIN.—JOSEPH COHEN, Brooklyn, New York city. The pin is intended for use in connector with campaign-buttons. Instead of the single point previously employed, two points are used, whereby the button is far more firmly held in place than heretofore.

NOTE.—Copies of any of these patents can 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.