Scientific American.

A Notable Feat of Bridge Moving.

A notable engineering feat was performed a few days ago by the substitution of a new 500-ton drawbridge for an old and much lighter one where the Pennsylvania Railroad tracks pass the Passaic River near the Market Street station, Newark, N. J. The actual substitution of one bridge for another was made in eighteen and one-half minutes. The old drawbridge, which was built in 1868, was 213 feet long. The river at this point is 400 feet wide. At both sides of the river stationary spans are at the ends of the draw. The delay of traffic is, of course, most serious on a railroad like the Pennsylvania. It is easy enough to rebuild stationary parts, even where trains run over them every few minutes, but the substitution of one drawbridge span, weighing some hundreds of tons, for another, was a serious and interesting problem. When open the ends of the draw rested on fenders, which protect the structure from injury by passing boats. The engineers lengthened these fenders up and down the river until it was 250 feet long and capable of sustaining the weight of the draw. The new draw was erected on the southern fender, and it rested on eight railroad tracks, which in turn rested on rails. The space between the fenders and the central pier of the draw was filled with piling and capped with rails. Sunday was selected as the best day for doing the work, as then the traffic is the lightest. When the time came for moving, jacks were put under the old draw, and it was lifted clear of its pivot and raised to the level of the new one, and the two were lashed together with wire rope. Powerful hawsers were roved between blocks from the upper end of the old bridge to the drums of two stationary engines, which were started a few minutes after traffic was stopped. In eight minutes the old bridge was clear of its structure and moved onto the upper extension of the fender, and in another ten minutes the pivot of the new bridge was exactly over the socket, and in half an hour more the new bridge had been lowered on this pivot and the gear by which it is worked from an engine overhead had been fitted. The actual substitution of one drawspan for the other was made in eighteen and onehalf minutes.

Repairs to the "Buffalo."

Repairs have been begun on the cruiser "Buffalo" at the Brooklyn navy yard. When they are completed, the vessel will be an excellent addition to the navy. She will be fitted for special transport duty between

New York and Manila. The entire interior of the vessel will be remodeled and many improvements will be added. The engine room will be refitted and regular man-of-war quarters will be added. An ice machine will be introduced, and a larger evaporating plant has been purchased for the vessel. About \$40,000 will be spent in these improvements, so that the ship will be worth at least \$700,000. She will be painted white and fitted with a number of modern guns. We have already, on other occasions, given the history of this

Automobile News.

An automobile club is to be formed in Philadelphia. Steam wagons are to be employed in hauling borax

According to The Motor Car Journal, the Austrian Ministry of Commerce is reported to be contemplating the introduction of motor cars for the conveyance of mail bags to and from the railway stations as well as for the delivery of parcel's post packages and the collection of letters from the pillar boxes.

The Matin's nine-day automobile race around France terminated at St. Germain on July 24. The winner was M. Réné de Knyff, a Belgian, who covered the distance (1,428 miles) in 44 hours, 44 minutes, 9 seconds, or at an average speed of about 32 miles per hour. In many parts of France the country was hilly and sometimes mountainous, and the carriages provided with the greatest horse power showed themselves to special advantage in hill climbing.

Mr. and Mrs. Davis have, owing to accidents to the machinery of their automobile, only reached Syracuse. The trip will be continued July 29.

Messrs. Haynes & Apperson, builders of an automobile of the same name, are making a trip from Kokomo, Ind., to Brooklyn. No attempt at fast time is being made and the average speed is fourteen miles per hour.

The automobile show at the Tuileries Gardens, Paris, has been very successful, and the number of vehicles shown has been very large and the exhibits are valued at over half a million dollars. The electric vehicles are particularly in evidence. Many of the French vehicles seating from two to three people rose in price from \$700 to \$1,200.

In France automobile accidents are becoming many and serious, and, unfortunat 1y, the victims are usually the automobilists themselves. The former mayor of Ay, M. Bollinger, was riding in his automobile down a hill; they were going at a pretty good pace when the brakes failed, and suddenly the carriage, for some unaccountable reason, turned completely over, all the passengers being thrown underneath the vehicle. M. Bollinger was instantly killed and the others were seriously injured. In Belgium a well-known sportsman ran over a child with his motor cycle, broke the child's arm and leg, and he received a fractured skull. M. Pierre Giffard, an authority on the subject, attributes the alarming and constantly lengthening catalogue of accidents to excessive speeds which the drivers give their carriages.

The Current Supplement.

The current SUPPLEMENT, No. 1231, has many articles of unusual interest, the most important being "Geodetic Work in Spitzbergen," by Prof. J. H. Gore, an illustrated article of great interest. "Microbes in Co-operation" is by G. Clarke Nuttall. "New French Automobile Fire Engine" is described and illustrated with drawings, giving details of the mechanism. The usual "Trade Suggestions of the United States Consuls," "Miscellaneous Notes," "Selected Formulæ" and "Trade Receipts and Suggestions" are published. "Building Railways in the Field by the Railway Corps of the German Army" is an illustrated article showing how soldiers build railways in fields. "The Electric Tramway of the City of Tours" describes the Diatto system. There is also an interesting article on "The Nuraghi of Sardinia and Similar Structures." These are towers which compare in interest with the famous round towers of Ireland. They are of enormous size, and there are more than 3,000 on the island, "Some Experiments in Making Rubber Substitutes" is an interesting technical article.

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RECENTLY PATENTED INVENTIONS.

Electrical Apparatus.

MEANS FOR PREVENTING SPARKING WHEN

MAKING AND BREAKING CIRCUITS. - ADOLPH

MÜLLER, Hagen, Westphalia, Germany. A circuit in

which an electromotive force is opposed to that of the

current source can be broken without sparking by in-

creasing the opposing electromotive force until it equals

that of the source of current before breaking the circuit.

This is effected, according to the present invention, by

introducing mto the circuit, before disconnection, a bat

tery of elements which easily becomes polarized. Such

a battery is immediately polarized on entering the cir-

cuit to the tension of the current within the circuit; or it

immediately increases any opposing electromotive force

which may be present in the circuit until that force

INCANDESCENT LAMP. - ANDREW H. MILLER,

Central City, Colo. The filament of this incandescent

lamp is in two sections and is associated with such con-

nections as permit it to be cut in and out of circuit in

Mechanical Devices.

LOUGHLIN, Leavenworth, Kans. In the wheel sup-

ported frame of the machine a primary-movement shaft

worm-wheel. A clutch member fast to the shaft drives

the worm. Gearing connects the worm-wheel with the

wheels of the frame. In a swinging frame on the main

Railway-Appliances.

CATTLE-GUARD.-JOSEPH W. Ross, South Car-

armed with spikes to prevent cattle from passing. The

stated that thereby a convenient angle is obtained for

ing for the plates at a point where they are especially

LOCKING DEVICE FOR CAR COUPLINGS.-

couplers are subject to accidental release of the knuckle

driving the spikes, and that the ties afford a stiff back-

weak and liable to be indented by the hoofs of animals.

FLOOR-SURFACING MACHINE. - HENRY MC-

is equal to that of the source of current.

desired to vary the power of the lamp.

or true-surfaced without excessive labor.

draw-head is hung above the free end of the lever. The upward movement of the key is prevented until lever and dog have been simultaneously lifted.

SIGNAL-LAMP-RAISING DEVICE.-THOMAS J. Walsh, Walton, Ky. The object of the invention is to provide a simple apparatus to raise and lower signallamps at railway-stations, thus obviating the danger incurred in using the customary portable ladders. At the upper end of the signal-lamp mast a lever is pivoted from one end of which a pulling device extends downwardly, and by the other end of which a pulley is carried. A rope is passed around the pulley and connected with the lamp. By this arrangement, a lamp may be raised from the station or office.

Miscellaneous Inventions.

CISTERN.-WILLIAM J. SLACK, La Grange, Ind. The inventor has endeavored to provide an improved attachment for removing foul water and sediment from cisterns. The attachment is a casting formed with circumferential flanges to adapt it for forming a watera variety of ways, thus permitting the regulation of the tight joint with the wall of the cistern, and with a cenpower of the lamp. By means of the invention three tral depression or cavity which is of conical form to distinct adjustments and hence three distinct candle- adapt it to collect the sediment. A discharge passage is powers can be obtained. This renders the lamp es- provided which communicates with the cavity, and pecially desirable in hotels and hospitals where it is which removes the sediment and foul water by siphopic

SWINGING-DOOR ATTACHMENT. - JOHN H. WHITAKER, Davenport, Iowa. Waiters in restaurants and hotels have a habit of kicking open swinging doors, thereby often upsetting their travs and dishes. The present invention provides an attachment consisting of a is mounted, having a slidable worm meshing with a door. A padded wheel is mounted to rotate about its bracket secured to and extending outwardly from the vertical axis on the outer end of the bracket, and is arranged for engagement with the body or shoulder to open the door. Owing to the peculiar arrangement of frame cutting apparatus is mounted, driven by gearing from the primary-movement shaft. By means of this machine large areas of flooring can be quickly planed

INVALID-BEDSTEAD. -ELMER C. SCRIBNER, Neversink, N. Y. The invention comprehends a novel construction of sectional bottom members having the foot portion formed of two longitudinal frames capable of being raised in unison or independently, and a single rollton, Ky. The cattle-guard is of that form in which a crank-operated mechanism, including shifting clutches to railroad crosses a fence-line and is provided for some move into or out of operative position, whereby either distance along its track with an impassable road-bed one or both of the foot-frames can be elevated. The longitudinally-tiltable foot-frames are each made of two invention is distinguished from others of the same class hinged sections, so that when elevated they may assume by spiked zigzag plates having a bearmg on the an angle shape to accommodate the bending of the inties midway between their upper and lower angles. It is valid's knee,

CHURN.-HENRY G. SCHATZ, Commerce, Mo. The churn is provided with a vibrating dasher capable of being regulated to suit different churn-bodies. The dasher-shaft is reciprocated and vibrated by a wormshaft operated by a handle. An end of the handle is GEORGE P. STEWART, Palestine, Tex. Janney car. pivoted on one end of a rocking lever, and is adjustable on the lever to shorten or lengthen the stroke of the from engagement with the opposite coupling. To prevent worm-shaft.

PROCESS OF MAKING DRY PIGMENTS. loosely secured to the lower part of the key to control its | Thomas J. O'Sullivan, London, Ontario, Canada. This | nicating at one end with the steam-space and having a

sawdust with an iron salt, and then drying or burning it. Sawdust being a waste material, it follows that the pigment can be very cheaply made.

FOLDING BED FOR VEHICLES.-THOMAS LOTH-ERINGTON, Dallas, Tex. The folding bed is provided with a bottom, and transverse supports for the sides having vertical locking members at their outer ends. Box sides are adapted to rest on the supports and engage the side edges of the bottom and the vertical locking members. Lock bars are removably secured to the sides and adapted to engage the vertical locking members and the underof the bottom. The vertical locking members and lock-bars have engaging shoulders and lugs. The bed can be quickly and conveniently removed from the running-gear, to permit the bed's being changed from a wagon-box to a dray, or from a coal-car to a flat-car.

ACETYL ENE-GAS LAMP. - GEORGE W. BAYLEY Brooklyn, New York city. The lamp comprises an inner and outer casing. The inner casing contains carbid and has a pressure-controlled valve in its bottom for the admission of water. An annular, closed water-reservoir within the outer case is located above the carbid in the holder. A valve in the bottom of the reservoir provides a means for allowing the water to flow into the outer casing before being admitted to the carbid. A vent connectsthe upper part of the water-reservoir with the gasspace of the lamp.

SPOUT-GATE AND MECHANISM FOR OPERAT-The invention is more particularly designed for use in connection with inclined spouts for discharging material from a dock into a vessel or from a platform into a car. The gate is mounted to swing vertically between supports at the discharge end of the spout. A locking-frame is mounted to slide in guides on the supports and is connected with the gate, so that when it is raised the gate will be opened.

WASTE-PIPE PLUG.-JOSEPH H. LITTLE, Ma tan, New York city. The present invention provides a chainless plug having a link attached thereto converging in a portion of its length and then diverging and having inwardly-turned hooks. In applying the plug, the link will be forced downwardly over a member of the strainer The hooks will be spread apart so as readily to pass the member of the strainer. When water is to be retained the plug is inserted. When it is desired to draw the water the plug is pulled up until the contracted portion of the link comes above the strainer, the hooks preventing the total detachment of the plug.

FIRE-ESCAPE -- CHRISTOPHER PEEL, Manhattan New York city. An upright ladder on the building is connected with foldable guard-walls above the ladder and adjacent to the windows of the building. The walls each have a foot-board foldable over an aperture thereof guard-walls are adjusted outwardly from the building wall.

BOILER-ATTACHMENT .- CHARLES W. SOMMER, Aberdeen, Miss. The attachment is especially designed for the collection and removal of sediment. The attachment comprises a pipe-line beneath the boiler, commu-

pipe-line and establish communication between the lower portion of boiler and pipe-line, A branch communicates with the pipe-line and extends upwardly into the boiler and has openings adjacent to the crown sheets. When sediment is forced through the pipe-line, a suction is created in the supports, so that any sediment remaining in the bottom of the boiler is drawn through into the pipe-line and forced out by the steam.

GAME.-WILLIAM A. WISSEMANN, Manhattan, New York city. The game simulates the battle of San Juan Hill and involves a fort or block-house over which a hostile flag is flying, the construction being such that by manipulating a number of balls so that they will enter the block-house, the supposed hostile flag will be automatically caused to disappear and an American flag

ROTARY BRUSH .- PETERK. WESTERGARD, Orangeburg, N. Y. The brush is designed for the use of barbers and stablemen to remove impurities from the hair or scalp. The rotary brush is mounted in a frame and is secured to a vertical standard. On the standard a hand-wheel is journaled by which the brush is turned through the medium of bevel-gears. Beneath the brush a receiver is mounted which collects the impurities removed from the hair or skin.

HUB FOR VEHICLE-WHEELS.—CASIMIR C. BAL-LIN, Rue de Chateaudun 5, Paris, France. The invention is chiefly characterized by the interposition between the ING THE SAME.-HENRY F. Kuss, Escapaba, Mich. wheel-nave proper, which carries the spokes of the wheel, and the revolving socket supported on the axle, of an elastic non metallic pad or cushion, the soft body of which diminishes the force of the jolts. This pad is formed of two series of caoutchouc balls arranged concentrically around the central socket and in the first place tightly packed in a chamber or race. The pad is made in sections for permitting the movements of compression at the moment of the shock to be effected by simple displacement of the elastic material itself and not by rubbing on the walls which inclose it, as is the case with a continuous ring.

> FIRE-ESCAPE.-José Delgado y Aguilar, Brooklyn. New York city. A strong yet simple device has been provided by this inventor for permanent attachment to the outside or inside of a building, which attachment affords a rapid means of escape from burning buildings irrespective of the number of floors. The invention consists of a simple arrangement of a bracket carrying a pulley around which an endless rope runs. At the lower end of the device a controller is provided which regulates the speed of the descent.

LIGHTING ATTACHMENT FOR VAPOR-LAMPS. -James A. Yarton, Omaha, Neb. The invention relates to improvements designed for attachment to oil-gas burners of that kind in which a generator is heated by and adapted for projection beneath a window when the the flame of the burner; and it comprises essentially a carbureter of special construction which is designed to furnish a limited quantity of gas applied to heat the generator to working condition before the ordinary or service generator is brought into use.

HORSESHOE. - WILLIAM CAHILL, San Francisco, Cal. The horseshoe is especially designed for use on racing-horses. A light-metal plate is adapted to be atupward movement. A pendent weighty dog on the process of producing dry pigment consists in saturating blow-out at the other end. Hollow supports sustain the tached to the horse's hoof to hold in place an elastic pad,

this, the inventor employs a transverse rockable lever

which bears against the frog of the hoof. At its lower face the plate has a bar or shoe constructed and arranged with relation to the plate in such a manner as to protect the hoof more effectively than the devices heretofore provided.

SCREEN FOR STAMP-MILLS.-MARTIN R. DRIS coll, Frisco, Utah. The mill has an apertured frame above which a roll of screen material is mounted, having a portion extending over the aperture. A clamping-frame extends about the lower and side edges of the aperture and covers the edge of the screen material. The frame has vertically-extending bolt-recesses in its side bars, clamping-bolts within the recesses and an auxiliary clamping-bar engaging the outer face of the lower side of the clamping-frame. By loosening the clamping frames and bars the screen-cloth can be pulled down to bring an unused portion into use without stopping the

SEWING-MACHINE SHUTTLE. - PERCY H HEWITT, EDWIN A. COCKLE, and CHARLES MATTHEWS, London, England. An improved construction of shuttle is provided by these inventors, whereby the disadvantages incidental to the use of a special spool of small capacity are avoided. The shuttle has its case divided longitudinally into two parts, which parts are provided at their heels with interlocking projections and recesses engageable by a relative longitudinal movement of the parts and permitting a slight hinging action. One part has a transverse pin at its point and the other a longitudinal slot receiving the pin. On the point end of one part is a spring, engaging a catch on the other and straining the parts longitudinally to hold the interlocking parts in engagement.

WATER-WHEEL.-PATRICK HENRETTY, Belgrade Minn. The water-wheel comprises pulleys provided at intervals with peripheral sockets. The bucket-chain used consists of a series of buckets equally flared on both sides of a central line and provided at their juncture with eyes. Through the overlapping eyes of adjoining buckets a shaft is passed, provided alongside of the buckets with rollers operating in the sockets of the pulleys. Links connect adjacent shafts outside the

SHANK FOR CORNETS .- WILLIAM H. HORN, San Francisco, Cal., and CHARLES L. WAIN, Kamloops Canada. The shank is arranged to permit the performer to set his cornet to different keys without requiring separate shanks. The shank is made in two sections sliding one within the other, the outer section having a head with internal threads and the inner section having two external threads capable each of engaging with the threads of the head to hold the inner section in either one of two

CHIMNEY TOP OR VENTILATOR.-JOSEPH A HODEL, Baltimore, Md. The novel features of this invention are found in the effective method of securing the base-plate to the chimney by means of anchor-bars in supporting the top carrying the cowl by means of strong slender standards so that no obstruction is offered to the free outlet of smoke from the flue pipe, in securing the vane directly to the bearing-piece, while the guard-plate is held thereto by means of arms, and in the novel method of counterbalancing the guard-plate and vane. The merits of the invention lie in the uninter rupted passage provided for the smoke, in the prevention of downdraft, and in the counterbalancing of the moving parts.

Designs.

HAMMER-HEAD. - DANIEL S. WILLIAMS, Salida, and FREDERICK R. WATERS, Ouray, Col. The leading feature of the design is the form of the flared groove or socket in the side of the polygonal hammer-head

ORNAMENTED STONE FOR JEWELRY.-JOSEPH L. HERZOG, Manhattan, New York city. The design consists of an elk's head produced upon a background

SHOE-LACE FASTENER.-George H. RICHARDS, Memphis. Tenn. To prevent the tearing of the shoelace and yet to hold the lace securely in place, the inventor forms the head of the fastener on its under side with a spherical surface.

CREAM-SEPARATOR.-CHARLES S. HANNA, West body having a base and an inverted cone-shaped bottom terminating at its apex in a gage with a faucet.

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.

NEW BOOKS, ETC.

THE MANUFACTURE OF SAUSAGES. BY James C. Duff, S.B. New York: National Provisioner Publishing Company, 1899. Pp. 131, 16mo. Price \$2.

s is the first printed in English and there has been a considerable demand for a good book on this subject. The book will pay its cost many times over to even the smallest retail butcher, while to the sausage maker it will prove invaluable. Not only is information regarding meats, spices casings, stuffings, etc., given in great detail but there are almost endless receipts for all kinds of standard and fancy sausages, some of the names of which recall faraway Strasburg and Nuremberg. It is an admirable book and the literature relating to provisions is so limited that we welcome every addition made to it.

DESCRIPTIVE MENTALITY FROM THE HEAD, FACE AND HAND. By Holmes Merton. Philadelphia: David McKay. 1899. Pp. 220. 8vo. 600 illustrations. Price \$1.50.

It is probable that we all use physiognomy more or less to judge of character, and yet it is only reasonable to believe that those who are constantly engaged in studying this subject may carry it out to a remarkable degree. We do not believe that character can be told to any extent by the lines of the hand, but there are many people who think that it can, and to them the latter half of the book will undoubtedly appeal.

Business and Personal.

The charge for insertion under this head is One Dollar line for each insertion; about eight words to a line Advertisements must be received at publication office as early as Thursday morning to appear in the follow

Marine Iron Works. Chicago. Catalogue free. "U. S." Metal Polish. Indianapolis. Samples free. Gasoline Brazing Forge, Turner Brass Works, Chicago

Yankee Notions. Waterbury Button Co., Waterb'y, Ct. Handle & Spoke Mchy, Ober LatheCo., Chagrin Falls, O.

"Criterion" Acetylene Generators, Magic Lanterns & accessories. J. B. Colt & Co., Dept. N. 3-7W. 29th St., N. Y. Ferracute Machine Co., Bridgeton.N. J., U.S. A. Full

line of Presses, Dies, and other Sheet Metal Machinery. Inventions developed and perfected. Designing and machine work. Garvin Machine Co., 141 Varick St., N. Y.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foct of East 138th Street, New York.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4. Munn & Co.. publishers, 361 Broadway, N. Y.

The Milling Cutter Department of The L. S. Starrett Co. will be continued under the firm name of Gay & Ward, Athol, Mass. Owing to the increased business of the tool department, Mr. Starrett has withdrawn his interest in the milling cutter department, in order to devote his attention exclusively to the manufacture of fine Messrs. Gay & Ward still continue to manufacture milling cutters under the immediate supervision of Mr. Gay, with increased facilities for producing an unsurpassed line of cutters.

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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.

In quiries not answered in reasonable time should be repeated: correspondents will bear in mind that some answers require not a little research, and, though we encleavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of

Winerals sent for examination should be distinctly marked or labeled.

(7703) W. G. B. says: Have you published a formula for making an ink that would do to write on photographic negatives (for numbering them, etc.) with an ordinary pen? If so, kindly advise me the number of the copy in which the above formula can be found. A. To print the name on the photograph, several methods may be adopted. The simplest is to write the title of the subject on a slip of paper with aniline copying ink, or with ordinary copying ink mixed with gamboge or vermilion. Then slightly dampen the surface of the negative near the bottom right or left hand corner in as unobtrusive and unimportant a portion of the picture as possible. Press down the paper with the writing upon it. Leave for a few minutes and then remove the paper, when the writing will be found to have adhered to the negative. When printed, the name will print out white. Another way is to write backward on the negative, while another and better plan is to write the name in Indian ink on the surface of the paper be Hebron, N. Y. The design consists of a cylindrical foreit is printed on. The ink will wash off in the after operations and leave the name in white where the surface of the paper has been protected by the ink.

> (7704) J. W. M. writes: There has been quite a discussion here caused by your article on the 16-inch gun. The question is, "What is the fall of the curve of the water when looking one mile out to sea?" Or rather the ratio. For instance, the first mile view will have a fall of 8 inches. What will the second mile show? A. Allow for refraction of the atmosphere and the earth's curvature when looking out to sea;

For	r 1	mi.	le	0.57	feet.
	2	66	***	2.29	**
••	3	**		5.14	46
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(7705) D McC. writes: Replying to J. W. B., No. 7689, of Notes and Queries, in Scientific AMERICAN of July 22, 1899, would say that the "Magical" or "Mineral" sponge he inquires about is made of 25 pounds common whiting, 4 ounces powdered soap bark and 4 ounces powdered alum, thoroughly mixed and inclosed in a small cotton flannel bag (size to fit the hand), with the "fuzzy" side out and tightly sewed up To use, thoroughly soak in water and rub article to be polished afterward rubbing dry with another cloth. After using the sponge (f) becomes dry and hard, but can be again used until worn out by pounding the cake inside the cloth to a powder.

(7706) J. J. H. asks: Will you please answer through your paper at what degree does aluminum melt and what metals it will melt with, and oblige a forty-six year reader of your paper. melts at 625 degrees C. or 1,157 degrees Fah. It can be alloyed with copper, nickel, tungsten, manganese, chronium, zinc, tin, and titanium.

INDEX OF INVENTIONS

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