The best method for your purpose is the Sylvester process: into each gallon of hot water required to cover the surface shave 1/2 pound of castile soap; let it dissolve, but do not make suds, and apply to the dry concrete surface boiling hot, using a wide soft brush such as a whitewash brush. After the soap solu-tion has dried, apply lukewarm a solution of 1/2 pound powdered alum to each four gallons of water. Two repetitions of this process should close all pores and render the concrete waterproof; if not, try a further coat or two. There is no reason why the above preparation should be affected by soda, but if it is unsuccessful you might try a coat of water glass or write to the Concrete Association of America, 225 Fifth Avenue, which has conducted a number of valuable experiments in connection with varied uses of cement and is glad to give information.

NEW BOOKS, ETC.

A PORTFOLIO OF PORTRAITS OF EMINENT MATHEMATICIANS. Edited by David Eugene Smith. Chicago: The Open Court Publishing Company. Portfolio containing 12 plates with descriptive text on tissues. Price, \$3.

The portfolio before us contains some admirable selections and reproductions of portraits of many mathematicians, such as Descartes, Pythagoras, Archimedes, Fermat, Leonardo of Pisa, Euclid, Cardano, Leibnitz, Napier, Viète, Newton, Thales, and the collection would make excellent illustrative material for the classification of mathematical industries. The portrait of Descartes is particularly fine.

How to Identify the Stars. By Willis M. Wilhelm, Ph.D. New York: The Macmillan Company, 1909. 8vo.; 38 pp.; plates. Price, 75 cents net.

The ability to recognize the important brilliant stars and to locate the more conspicuous constellations is both an interesting and a AND EACH BEARING THAT DATE useful acquirement. The number of people who have a real interest in popular astronomy [See note at end of list about copies of these patents.] and a fair acquaintance with the stars and constellations is strikingly increasing, and they will find a real pleasure in this information. The object of this little book is to enable the latter persons to identify the various constellations and stars. The method here followed and the material presented is essentially the same as that used in the course of descriptive astronomy in Williams College.

LIGHT AND SOUND. A Textbook for Colleges and Technical Schools. By William S. Franklin and Barry Mac-nutt. New York: The Macmillan Company, 1909. 8vo.; 344 pp. Price, \$1.60.

There always seems to be a field for a good book on the very important subjects of light and sound. The literature is already vast on these subjects, but the authors have succeeded in presenting some phases in an entirely new light. There is an entire absence of the timehonored illustrations which have been copied from book to book. The diagrams and illustrations are very numerous and are well executed. The book will prove of value to all physicists.

THE RISE AND PROGRESS OF THE BRITISH EXPLOSIVES INDUSTRY. Published under the auspices of the Seventh International Congress of Applied Chemistry by its Explosives Section. London: Whittaker & Co. New York: The Macmillan Company, 1909. 4to.; pp. 418. Price, \$5.25 net.

This very enlightening book gives an exceedingly interesting history of British explosives, reproducing many curious engravings. This is followed by chapters on the concussion caps, safety fuses, military fireworks, and pleasure fireworks. Then comes an excellent bibliography and a chronology from 1242 to The existing government and private establishments are then described. The work is highly technical, but will prove of great interest to those whom it concerns.

THROUGH THE YUKON OF ALASKA. T. A. Rickard. San Francisco: Mining and Scientific Press, 1909. 8vo.; 392 pages. Price, \$2.50.

This book records observations made in the course of a journey in the Yukon Territory in the District of Alaska during the summer of 1908. The sections devoted to the development of mining methods are particularly valuable, and the book should prove of interest to everyone who has ever been to Alaska and the Yukon Territory or is thinking of doing so. We are particularly taken with the 175 illustrations, which are admirably executed. The book is well printed and bound.

EXPORTERS' ENCYCLOPEDIA FOR 1909. New York: Exporters' Encyclopedia Company, 1909. 12mo.; pp. 655. Price,

The present volume contains full and authentic information relative to shipments for every country in the world. The Exporters' Encyclopedia is now in its fifth year, and is a recognized standard authority among export shippers, and has the strongest indorsement of all the transportation lines and export houses, manufacturers, etc., engaged in export trade. It gives exactly the information which exporters require to enable them to ship their goods with the minimum of expense and trouhle. It is a valuable compendium for anyonal who is at all interested in export trade.

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INDEX OF **INVENTIONS**

For which Letters Patent of the United States were Issued for the Week Ending July 20, 1909.

Acid, making nitric, F. L. Schmidt	928,545
Adapter, H. S. Salt Advertising automaton, D. F. Brown. Advertising shade for incandescent lamps, J. de Yongh. Agricultural implement, W. L. Paul. Air, centrifugal apparatus for separating solid matter from, A. Lebrasseur. Air compressor, T. O. Perry. Air moistener and deflector, hot, W. M. Roeder Air mover A. Mathis.	928,844 928,474 928,628
J. de Yongh	928 ,572 928 ,6 90
Air, centrifugal apparatus for separating solid matter from, A. Lebrasseur Air compressor, T. O. Perry	928,673 928,326
Air moistener and deflector, hot, W. M. Roeder Roeder A. Mathis. Air ship, S. Lake Airship, aeroplane, F. A. Newell. Alfalfa drier, R. S. Rowland Alkali chlorids, electrolysis of, J. Billitzer. Anchor, stockless, W. S. Bickley. Animal trap, M. M. Franks. Animal trap, G. J. Miller Animal trough, F. L. Stewart. Apparel apparatus, W. D. Forbes. Armature colls, machine for applying tape to, J. S. Downs. Armor plates, treating, S. S. Wales. Automatic lubricator, F. L. Allen. Automobile fifth wheel, E. A. Oliver. Automobile motor, M. & W. Eastman, ressue Automobiles. friction drive mechanism for.	928,703 928,775 928,524
Airship, aeroplane, F. A. Newell	928,687 928,541 928,734 928,895
Anchor, stockless, W. S. Bickley	928,895 928,649 928,779
Animal trap, G. J. Miller. Animal trough, F. L. Stewart. Apparel apparatus, W. D. Forbes	928,779 928,560 928,437
to, J. S. Downs	928,592 928,412
Automatic lubricator, F. L. Allen	928,417 928,790
issue Automobiles, friction drive mechanism for,	12,993
issue Automobiles, friction drive mechanism for, A. B. Cole	928,739 928,806 928,445
Axles, method of and means for repairing, A. F. Hunt	928,519
Wilson & Culley. Bag. See Hand bag. Bag frame fastener I S Isider	928,415
Ball cleaning device, golf, H. Woodward Ball players, training device for base, W.	928,661 928,832
Wilson & Culley Bag. See Hand bag. Bag frame fastener, J. S. Isidor. Bail cleaning device, golf, H. Woodward Ball players, training device for base, W. G. Lentz Ballistic plate, S. S. Wales. Bank, portable, B. S. Wakeman. Barbers' chairs, paper actuating device for, D. B. Brown. Barrel bodies from pulp, apparatus for mak-	928,674 928,348 928,483
Barbers' chairs, paper actuating device for, D. B. Brown	928,243
ing, W. H. Decker	928 ,247 928 ,248
Barrel bodies from pulp, apparatus for making, W. H. Decker. Barrel bodies of paper pulp, apparatus for making, W. H. Decker. Barrel bodies of paper pulp, apparatus for forming bilged, W. H. Decker. Barrel press. J Treml.	928,249
Eurice press, by Lemming	928,562 928,762
Basket for holding dishes and plates, A. Insinger Bearing roller, A. Schilling. Bed, A. K. Taylor. Bed, covered, L. J. Wilson. Bedstead mounts and the like, machine for buffing, J. F. Gail.	928,800 928,821 928,298
Bedstead mounts and the like, machine for buffing, J. F. Gail.	928,254 928,588
buffing, J. F. Gail. Beer dispensing apparatus, H. S. Cornish Beets, machine for unearthing, O. N. Frank- man Bell and alarm, combined door, H. W.	928,594
Bell and alarm, combined door, H. W. Dubbs	928,369 928,376
Belt fastener, G. H. Smith	928,556 928,840 928,460
Bell and alarm, combined door, H. W. Dubbs Bell fastener, sleigh, W. C. Frindell. Belt fastener, G. H. Smith. Belt fastener, R. M. Bennett Bench clamp, J. W. Kincaid. Binder, loose lear, L. Streit. Block signaling system, D. J. McCarthy. Blower, pressure, E. Bassler. Boat, A. E. Apel. Boiler tube cleaner, S. M. Cockburn. Book covers, making, C. L. Baldauf. Bookbindier, R. J. Nicholson. Bookbinding, D. Z. Howell. Bookcase door guide, sectional, Weis & Hehle	928,342 928,396 928,624 928,579
Boat, A. E. ApelBoater Boater Boater tube cleaner, S. M. Cockburn	928.361
Book covers, making, C. L. Baldauf Bookbinder, R. J. Nicholson	928,623 928,878 928,518
Bookcase door guide, sectional, Weis & Hehle	928,566
capping or closing charged, E. K. Moore Box, W. R. Parsons	928,781 928,881
Box lids in an open position, means for supporting, Powell & Renwick Box top, W. H. Perkins	928,697 928,793
Braids and trimmings, machine for making, J. E. Kirberg928,461, Brick machine G. M. Griswold	928,462
Broom, F. Becker	928,490 928,284
Brush bridle, adjustable, W. Reese	928,699 928,699
Bookcase door guide, sectional, Weis & Hehle Bottles or other receptacles, machine for capping or closing charged, E. K. Moore Box, W. R. Parsons	928,542 928,549
Brushes, manufacture of, J. J. Potter	928,401 928,253
Building structure, C. C. Stutz	928,343
Burglar alarm, W. A. Helphenstine	928,754
Burial shirt, C. C. Holcomb	928,655
Cape, breeder's, T. H. Knaak	928,463
Camping device, canvas, A. G. Lukenbill	928,391
Can ends, runway for, J. F. Wing	928,725
Brushes, manufacture of, J. J. Potter. 928,548, Brushes, manufacture of, J. J. Potter. Building mechanism, J. F. Gail. Building structure, C. C. Stutz. Buildings, construction of, Marshall & Fox. Burglar alarm, W. A. Helphenstine. Burglar alarm, S. B. Petry. Burial shirt. C. C. Holcomb. Cable terminal, F. B. Cook. Cage, breeder's, T. H. Knaak. Calculating machine, A. J. Meier. Camping device, canvas, A. G. Lukenbill. Can, J. G. Swain. Can ends, runway for, J. F. Wing. Candy pail, C. A. Lee. Candy pail, C. A. Lee. Candy pail cover. Criffin & Johnson. Canning apparatus, L. L. Lawrence.	928,263
Canning apparatus, L. L. Lawrence	928,773

Canopy, L. F. Busenbark	928,495 928,356 928,286	4444
Car, dump, H. Pries		F
		F G G
Car rerailer, R. H. Smith. Car, stock, T. J. McKay. Carbid feeding device, A. Davis. Carbureter, F. Syagell.	928,810 928,269 928,853 928,710	G G
Cards, playing, W. T. Eddins	928,511	G G
E. Jackson Cash register, W. H. Muzzy. Casting machine, F. N. Cline. Cement and like materials, process of and apparatus for burning, B. E. Eldred Cement post attachment, E. M. Slayton Coment process of and apparatus for burning.	928,607 928,267 928,246	G G
apparatus for burning, B. E. Eldred Cement post attachment, E. M. Slayton, Cement, process of and apparatus for burn- ing, B. E. Eldred	928,512 928,807 928,513	G G
Centrifugal device, F. Hampl	928,750 928,912	G
rington Chuck for high-speed drills, J. O. Reynolds Churn power, W. S. Whitney	928,305 928,700 928,297	G G
Circuit breaker, automatic H. W. Cheney.	928,252 928,451 928,901	G G
Circuit closer, O. M. Tustison	928,824 928,388 928,823	G G
Clasp. See Piling clasp. Clock, chime, P. H. Klein, Jr. Clothes frame, revoluble, J. A. Turpin. Clutch, C. P. Hollister. Clutch, friction, H. A. Krueger. Clutch, friction, H. A. Krueger. Coal handling apparatus, G. W. Freeland. Coaster, wheel, L. R. Valentine. Cock, gas, C. W. Boyse. Cock seating washer, J. H. Glauber. Coffee roaster, N. T. Coley. Coin controlled lock, H. B. Meade. Coke oven, L. Bansart. Collar, coat, M. Koppelman. Collar stay, H. A. Aldred. Collar supporter, J. C. Doran.	928,656 928,671 928,871	G
Coaster, wheel, L. R. Valentine	928,716 928,898 928,599	GGGGG
Coffee roaster, N. T. Coley	928,500 928,613 928,302 928,262	G G G H
Collar stay, H. A. Aldred	928,573 928,250 928,621 928,785 928,485	H H H
Collar supporter, H. A. Aldred. Comb, J. C. McLean. Comb attachment, H. H. West. Commutator for electrical machines, F. R. Kunkel	928.918	日日日日
Kunkel Compass, beam, H. E. P. Taylor Concentrating apparatus, C. A. La Point Concrete construction forms, bond of, C. M. Markham	928,712 928,870 928,392	H
Concrete constructions, means for reinforcing, J. T. Simpson	928,475	H H H
J. M. Dudley	928,430 928,858	日日日日
W. H. Fahrney. Concrete tiling, machine for making, R. Z. Snell	928,646 928,812	田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田田
Conduit, W. HoughtonConduit, underground, Way & FreezeConduits, cable operated carrier for, Alexander & Appel.	928,606 928,826 928,300	
ander & Appel. Controller, H. Smith. Conveying apparatus, J. T. Cowley. Cooker, J. C. Prims.	928,707 928,365 928,795 928,383	H H H
Cooker, J. C. Prims. Cooking utensil, Hill & Zahnter. Cooking utensils, heat distributer for, A. B. Cruickshank Cooler, V. F. Barbaro.		H
Core, E. H. Proffitt	928,538 928,748 928,669 928,317	日日日日日
Cotton press, B. Thoens. Coupling head, auxiliary, P. W. Hogan Crane, P. H. Douglas.	928,563 928,654 928,640	Ir Ir
B. Cruickshank Cooler, V. F. Barbaro Core, E. H. Proffitt Coring machine, cabbage, C. B. Gedney. Corset, apparel, D. Kops. Cot and hammock, combined, H. Menten Cotton press, B. Thoens. Coupling head, auxiliary, P. W. Hogan. Crane, P. H. Douglas. Crate, folding, C. E. Clark Crate, folding, C. E. Clark Crate, folding poultry, H. D. Dennis, et al. Crate, knockdown, J. B. Noyes Crucible, P. W. Shimer, Crushing or pulverlying machine, C. A. Doen, et al.	928,504 928,471 928,552	II II II II
Crushing or pulverking machine, C. A. Doen, et al	928,368 928,397 928,487	Ir Ir Ir Ir
Cultivator, E. W. Werden	928,723 928,604 928,769 928,265	K K L
Currents, device for steadying, P. H. Thomas Curtain fastener, E. J. Lombard	928,287 928,677	L
Thomas Curtain fastener, E. J. Lombard Curtain fixture, G. H. Forsyth Cut off, float, H. Mohr, Sr Cut off, rain water, E. E. Brott Cutlery, metal handle for, W. B. Hatfield	928,319 928,846 928,515	L
Cycle, P. C. Jeppesen	928,765	L
E. Abrahamson Cyclometer for bicycles, A. Ruffin. Cylinder ring, Wehrman & Trueblood. Dating machine, B. B. Conrad. Desk, folding writing, C. Mohr.	928,473 928,294 928,740 928,614	L
Dating machine, B. B. Conrad. Desk, folding writing, C. Mohr. Die, W. H. Grissom. Disappearing table, G. H. Witthaus. Display holder, B. Rosenberg. Display rack, J. D. Walsh. Display rack, folding, R. E. McKay. Distant register, W. H. Muzzy. Door securer, J. U. Tabor. Door stop or securer, R. Pitt. Draft device, H. J. Klasing. Drain inlet, J. & D. D. Friedman. Draw ber carrier C. H. Tomlinson	928,740 928,614 928,256 928,726 928,281 928,292 928,533 928,268 928,820	L
Display rack, J. D. Waish. Display rack, folding, R. E. McKay. Distant register, W. H. Muzzy. Door securer, J. U. Tabor.	928,533 928,268 928,820 928 279	L
Door stop or securer, R. Pitt	928 279 928,667 928,596 928 890	L
Drier; H. W. Shepard	928,706 928,749	L
& Axtell	928,780 928,275 928,836	L
Drum, mixing, J. W. Cumisky	928,565 928,741 928,850 928,891	L
Electric heaters, controlling means for, E.	928,857 928,402	M M
H. Richardson, et al. Electric iron, D. W. McClay Electric machine, dynamo, F. R. Kunkel Electric machine, dynamo, H. M. Scheibe Electric meter. D. C. Jackson.	928,532 928,771 928,799 928,521 928,251 928,285	M M
Electric meter, D. C. Jackson. Electric outlet box. C. J. Dorff. Electric wire conduit, H. N. Speer. Electrical currents, unidirecting, E. A. Burlingame	928,251 928,285 928,583	M M M
Electrical receptacle, weatherproof, F. J. Russell	928,282 928,547	М
Misstrome ametically assessed assessed a	928,371 928,516	M M M M
Electromagneticany operated apparatus, R. E. Hellmund Electroresponsive device, E. A. Terpening. Elevator, J. T. Cowley. Elevator door, sidewalk, C. S. Hoffman. Embroidery hoop, S. W. Gibbs. Engine, T. R. Thurber. Engine cylinder lubricator, J. A. Dauben-	928,345 928,364 928,756 928,598	M M M
Engine, T. R. Thurber. Engine cylinder lubricator, J. A. Dauben- speck Engines, drive gearing for traction, D. W.	928,715	M M M
Engines, fuel for internal combustion, G.	928,498	М
Envelop, R. D. Townsend.	928,380 928,407 928,410	M M M
Excavator shovel, tandem, C. C. Jacobs Fabric, J. L. Patterson Faucet, J. H. Glauber Feeder automatic C. J. Pob	928,258 928,535 928,378 928,400	M M M
B. Selden Engines, leveling mechanism for traction, R. C. Gorham. Envelop, H. W. Stuart. Envelop, R. D. Townsend. Excavator shovel, tandem, C. C. Jacobs Fabric, J. L. Patterson. Paucet, J. H. Glauber. Feeder, automatic, G. L. Poh. Fence tie forming die, B. A. Garlinghouse. Fertilizer distributer, W. J. Adams. Files. division plate for document, W. J. Vick Filter, F. B. Anderson.	928,400 928,377 928,835	M M
Fire escape construction, W. O'Keefe	928,325	M M M
Fire extinguishing apparatus with siphon arrangement. W. Bockem Fish line float. J. Garrard Fish stringing device. R. Coleman Fly wheel, G. Scaramuzza	928,897 928,439 928,427 928,544	M M

Forming machine, H. C. O'Bleness. Fruit cleaner, F. Stebler. 928,558, Fruit cleaner, F. Stebler. 928,558, Furnace, C. F. Diller. Furnace oven, removable, N. E. Storms. Furniture, etc., manufacturing material for making articles of, H. B. Morris. Fuse lighter, C. C. Myrick. Gage head, J. W. Beard. Galvanizing, G. L. Patterson, et al. Garment rack, F. Wolf. Garment supporter, G. Barfus. Gas, apparatus for generating hot com- pressed, H. Neumann. Gas burner valve, L. L. Carnahan. Gas engine, H. M. Yager. Gas extinguisher and lighter, J. A. Maton- sek.	928,616 928,559 928,907 928,816
Furniture, etc., manufacturing material for making articles of, H. B. Morris Fuse lighter, C. C. Myrick	928,266 928,685
Galyanizing, G. L. Patterson, et al Garment rack, F. Wolf Garment supporter, G. Barfus	928,422 928,398 928,728 928,421
Gas, apparatus for generating hot com- pressed, H. Neumann	928,324 928,497 928,299
Gas extinguisher and lighter, J. A. Maton- sek	928,776 928,494 928,808
Gas heater, J. A. Eddy	928,742 928,307 928,505
Gas extinguisher and lighter, J. A. Maton- sek Gas, furnace, J. Bueb. Gas, generating producer, H. F. Smith. Gas heater, J. A. Eddy. Gas lighting appliance, F. F. Dier. Gas lighting appliance, Dier & Primeau. Gas producer grate and means for removing ashes therefrom, H. F. Smith. Gas suitable for illuminating and heating purposes and making said gas, liquid, Gas, treament of acetylene, James & Wat- son	928,809 928,729
Gas, treament of acetylene, James & Wat- son	928,867 928,798 928,486
Gate, A. V. Rowe. Gear, variable speed, H. E. Williams. Gear wheel, N. D. Levin. Gearing, changeable speed, W. Scott. Gearing, speed, J. S. Barnes	928,676 928,705 928,240 928,568
Gearing, speed J. S. Barnes. Gearing, variable speed, W. A. Widmer. Gearing, variable speed, J. S. Barnes. Glass, annealing and hardening, J. J. Far- ling	928,894
Glass, annealing and hardening, J. J. Farling Glass in the heat, apparatus for working, J. Kremenezky Glass shade and screen, A. Steffin Gradlent instrument, R. Sobotka Grain separator, E. G. Clymans. Grain separator, E. G. Clymans. Grate, fireplace, J. H. Dwight Grip device, intermittent, H. W. Fellows. Gun, oil, T. B. Wilkinson. Gun, oil, T. B. Wilkinson. Gun with breech action, F. Jaeger. Hand bag, A. Schonberg.	928,670 928,340 928,557
Grain separator, E. G. Clymans	928,498 928,593 928,434 928,344
Gun, oil, T. B. Wilkinson. Gun with breech action, F. Jaeger Hand bag, A. Schonberg Harvester, cotton, A. W. Johnson	928,351 928,608 928,801 928,662
Hand bag, A. Schonberg. Harvester, cotton, A. W. Johnson. Hat, man's, E. B. Hollenbeck Hay rake and tedder, combined, L. M. Jones Heading machine, W. D. Thomas Heat conserving receptacle, Wilson & Friend Heater. J. J. Kelly.	928,384 928,457 928,409
Heaters, apparatus for automatically regu-	998 393
Heating device for lacquering, W. W. Vincent Hinge and brace, adjustable, T. D. Meyer. Hinge, extensible, W. F. Hunter	928,291 928,468 928,760
Hitching device, horse, R. Cardin	928,629 928,590 928,626 928,851
Holsting machinery, clutch for winding drums of, C. P. Turner	928,482 928,602 928,335
Hook and eye, S. A. Cinnamon	928,585 928,843 928,517 928,647
Heating device for lacquering, W. W. Vincent Hinge and brace, adjustable, T. D. Meyer. Hinge, extensible, W. F. Hunter Hitching device, horse, R. Cardin. Hoe, W. S. Davis. Holsting machine, J. Bowles. Hoisting machine, J. Bowles. Hoisting machine, C. F. Dallman. Hoisting machine, C. F. Dallman. Hoisting machinery, clutch for winding drums of, C. P. Turner. Holdback, C. Hastings. Hoof nippers, J. A. Ryden. Hook and eye, S. A. Cinnamon. Horse detacher, Borland & Benack. Horseshoe, G. F. Fassett. Hose connection, H. Strom. Hose connection, H. Strom. Hose coupling, J. P. Baird. Hose in J. P. Baird. Hose on the first of the fi	928,817 928,237
Hot air furnace, J. M. Keller	928.787 928,259 928,537 928,413
Hydrocarbon burner, W. Scrimgeour	928,854 928,337 928,886
Incandescent mantles, producing, G. Buhl- mann Inhaler, V. E. Randall Ink, R. W. Hochstetter Ink, R. Hochstetter	928,580 928,884 928,450
Ink, R. Hochstetter. Insulating joint, C. A. Jaynes. Insulator for third rails, L. Steinberger. Internal combustion engine, H. H. Simon	928,915 928,763 928,709 928,405
Internal combustion engine, E. Berliner Invalid's table, M. A. Hawley Iron, refining, P. Sejournet Kinetoscope, continuous film, C. B. Gillespie	928,842 928,752 928,551 928,443
Knitting machine, W. W. Burson Lamp, arc, Knapp & Schlesinger Lamp, gas, C. W. Boyse Lamps, Bunsen burner for incandescent gas,	928,244 928,464 928,899
Ink, R. Hochstetter. Insulating joint, C. A. Jaynes. Insulating joint, C. A. Jaynes. Insulator for third rails, L. Steinberger. Internal combustion engine, H. H. Simon. Internal combustion engine, E. Berliner. Invalid's table, M. A. Hawley. Iron, refining, P. Sejournet. Kinetoscope, continuous film, C. B. Gillespie Knitting machine, W. W. Burson. Lamp, arc, Knapp & Schlesinger. Lamp, gas, C. W. Boyse. Lamps, Bunsen burner for incandescent gas, M. Jacobs Lantern top, D. C. Kline. Last cond fastener, P. H. Hickman, et al. Latch, gate, J. B. Walser Latch, gate, J. B. Walser Latch, bergen bergindle automatic, E. U.	928,453 928,260 928,909 928,605
Latch, gate, J. B. Walser. Lathe, multiple spindle automatic, E. U. Harrison Lathes for boring elliptical openings, at-	
Lathe, multiple spindle automatic, E. U. Harrison Lathes for boring elliptical openings, attachment to, J. Shaw. Lathing, manufacture of metal, W. Klocke. Lathing, manufacturing metal, W. Klocke. Lavatory, H. Podmore. Lawn sprinkler, A. Fisher.	928,404 928,610 928,917 928,696
Lavatory, H. Podmore	928,372 928,514 928,916
Level and plumb, combined, J. L. Greene Leveling bar head, I. S. Hearn Life preserver, Krieger & Tallman Lighting fixture, preheating, W. N.	928,600 928,603 928,465
Lighting fixture, preheating, W. N. Best, Sr. Load retaining device, E. A. Thompson Lock, W. A. Hurst. Locks, antifriction bearing latch bar for, J. B. Webb. Locker hook, W. N. Vance. Locomotive boiler, O. D. Orvis Looms, pattern mechanism of, O. L. Owen. Looms, reed actuating mechanism for, J. A. Gendron	928,288 928,761
J. B. Webb Locometive boiler, O. D. Orvis Loom shuttle motion, J. A. Gendron	928,721 928,717 928,880 928,440
Looms, pattern mechanism of, O. L. Owen. Looms, reed actuating mechanism for, J. A. Gendron Lotion, G. Pucciareili	928,278 928,911 928,539
Low water alarm, F. D. Goodnough Lubricator, W. L. Newbaker Lubricator, H. A. Swanson Macaroni and the like, machine for mak-	928,650 928,686 928,819
Looms, feed actuating mechanism for, J. A. Gendron Lotion, G. Pucciareili Low water alarm, F. D. Goodnough Lubricator, W. L. Newbaker Lubricator, H. A. Swanson. Macaroni and the like, machine for making, J. Rivara Magnet, lifting, A. C. Eastwood. Magnet, polarized, E. A. Burlingame. Mall bag catching and delivering device, J. J. Cruse Mail catching and transferring apparatus, F. Blankenberger	928,796 928,510 928,582
J. Cruse Mail catching and transferring apparatus, F. Blankenberger Main and pipe cleaner, Greenan & Redford.	928,502 928,735 928,863
F. Blankenberger Main and pipe cleaner, Greenan & Redford. Mangle, C. H. Mattice	928,315 928,625 928,447
DOCKET, J. Havassy Matter or objects in quantities, examining, J. I. Solomon. Mattress, D. E. Miller. Measuring apparatus, R. Hoyt. Measuring device, dress, N. E. Jaeger. Meat cutter, C. W. Kuhn. Meat hanging device, J. E. Mowinckel. Meat products, smoking and curing, M. Brand	928,888 928,778 928,658
Measuring device, dress, N. E. Jaeger Meat cutter, C. W. Kuhn Meat hanging device, J. E. Mowinckel Meat products, smoking and curing, M.	928,454 928,389 928,530
Metal coating apparatus, H. M. Huxley Metal shaping apparatus. W. W. Bissell Meter system electrically controlled. H. P.	928,900 928,385 928,353
Microser gages, spindle lock for, L. S.	928,245 928,889
Novero Mold, J. F. Monnot Mold, L. A. Brown Mold for casting sash weights. J. C. & G.	928,789 928,470 928,493
L. George	928,441 928,714 928,354 928,786 928,764
Mine, buoyant mechanical submarine, T. Novero Mold, J. F. Monnot Mold, L. A. Brown. Mold for casting sash weights, J. C. & G. L. George Molding machine, W. B. Bolles Molding machine, T. E. McNamara. Molding machine, T. E. McNamara. Monkey wrench. ratchet, A. C. Jenrich. Mortising machines, pneumatic attachment for, E. E. Houghton. Montor, J. R. Morrison. Multiple pendant switch, C. D. Gervin. Musical instrument, pneumatic, T. P. Brown Musical instruments, automatic playing at- tachment for. P. Welin. Musical instruments, harmonic attachment for stringed. L. E. Hull Musical instruments, pneumatic action for, P. Welin	928,764 928,758 928,782
Multiple pendant switch, C. D. Gervin Musical instrument, pneumatic, T. P. Brown Musical instruments, automatic playing at-	928,782 928,597 928,357
Musical instruments, harmonic attachment for stringed. L. E. Hull	928,295 928,866
P. Welin	928,296

ORVILLE WRIGHT'S RECORD FLIGHTS AT FORT MYER.

(Concluded from page 88.)

Mr. Wright naturally tried to follow and obliged him to make a turn to the right in order to circle around the stake balloon at Alexandria in the right direction. Upon the return trip, after passing over the top of Shuter's Hill—a Ligh hill near the turn-a strong downward current drove the machine toward the earth, and the aviator was obliged to set the horizontal rudder sharply upward in order to regain his proper elevation. After doing this he flew steadily back to the starting point and crossed the line 14 minutes and 42 seconds after first passing over it on the outward journey. Deducting the time of the turn at the far end of the course, the time for the 10 miles was 14 minutes and 12 seconds, which corresponds to a speed of 42.25 miles an hour. This means that the Wrights will receive a bonus of \$5,000 in addition to \$25,000 they bid for supplying a 2-man machine. The flight was made with Lieut. Benj. D. Foulois as passenger, and, save for the points mentioned above, was uneventful according to Orville Wright. The precition with which he maintained his level while flying over a valley 200 feet or more in depth on the outward trip was remarkable, and had not the downward wind current caught him on the return trip, he would have accomplished this just as well. The undulation and veering out of the course owing to the wind doubtless made a slight diminution in the speed. Had there been no wind the brothers might have made faster time and obtained a greater bonus. But, on Pipe Cutting and Threading Machine the other hand, a flight under such conditions as obtained was a far better demonstration of the possibilities of the machine for war purposes, and the Signal Corps may well be proud of its first war aeroplane, which is without doubt the premier machine of the kind in the world to-day.

THE FIRST SUCCESSFUL CROSS-CHANNEL FLIGHT.

(Concluded from page 88.)

when the motor slowed down and stopped and he again came down in the Channel. Although his monoplane struck the water rather more gently than on the previous flight, Latham's nose was broken and his head cut open by his broken goggles, so forcibly was he thrown against some of the guy wires of his machine. Nothing daunted, however, he has announced that he will again make the attempt as soon as he recovers. Thus has been opened a new era in aviation—the era in which the flying machine is to be used for traveling from one country to another, be it over land or sea.

The triumphant 25-mile flight of Bleriot across the English Channel, which was accomplished in 37 minutes, or at the rate of about 40 miles an hour, is the culmination of a large number of more or less lengthy, yet successful flights that have been made by this aviator with his "No. XI." machine since it was first brought out last January. Some of the more recent of these flights we mention

During the past two months, M. Bleriot will stop the most victors dog (or man) without permanent injury. Perfectly safe to carry without permanent injury. Perfectly safe to carry without danger of leakage. Fires and recharges by pulling either his "No. XI." or "XII." monoplane. The former of these he has kept at Issy-les-Molineaux, while the "No. XII." machine has been at Douai. On June GEER MOTORCYCLES 8th he made two excellent 500-meter flights with the latter at Issy-les-Molineaux, the first alone, the second with his mechanic as passenger. On June 11th he made several short flights of from 500 to 600 meters in length, keeping the ma- HARRY R. GEER CO., 851 McLaram Ave., ST. LOUIS, MO. chine close to the ground; and afterward a magnificent flight of fully a mile, which was terminated by a double S turn at a height of 15 feet. With M. Guyot as passenger, another flight of 11/2 kilometer (nearly 1 mile) at a height of 7 meters (23 feet) was accomplished. The following day M. Bleriot made a straightline flight of about 250 meters (820 feet)



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with Santos Dumont and A. Fournier as passengers. This was the first time that three people had flown in an aeroplane. The same day several other flights were made with one passenger, the longest of these being about a mile in length at a height of 20 feet. By himself, Bleriot afterward flew about 3 miles.

On June 14th Bleriot made some more flights with his "No. XII." monoplane. After a short flight of 4 kilometers (21/2 miles), he landed to repair his magneto. As soon as this was accomplished he made a magnificent flight of 101/2 minutes duration, in the course of which he turned his machine in all directions and executed various maneuvers that demonstrated thoroughly its stability. Several times he took his hands off the steering wheel. The next day, after making a 5-minute flight at a height of 20 feet, he flew with a passenger, but the flight was stopped by the breaking of a connecting rod of the 8-cylinder motor.

On June 18th, Bleriot began flying again his "No. XI." monoplane, fitted with a 3-cylinder Anzani air-cooled motor of about 25 horse-power. He made a flight of 4 kilometers (21/2 miles). On the 21st he made flights of 3 and 61/2 minutes, the motor stopping from lack of oil. Just as he was starting on a third flight, the exhaust from the motor set fire to the gasoline in the carbureter, due to the latter being placed too near to the exhaust pipe. The flames were quickly extinguished with sand.

On June 25th, he took out his machine about 7 P. M., and, notwithstanding a quite heavy wind, he flew for 151/2 minutes, making about 12 circuits of the parade ground and showing perfect stability in spite of the violent wind gusts. Each time he passed over the aeroplane shed he took his hands off the steering wheel. The flight was terminated because of too much oil, which fouled the spark plugs. The flight was officially timed by M. Ernest Zens. At 7 A. M. the next day Bleriot made a record flight consisting of 20 circuits of the parade ground in 36 minutes 553/5 seconds. In the early evening he made three more cir-

On Monday, June 28th, Bleriot started making flights at Douai with his "No. XII." machine. He won the first of five prizes of \$400 each in a magnificent 11/2mile flight at a height of 65 feet. In a second flight made on this day, he carried a passenger once around the field.

On June 30th, he tried to break his previous record at Issy with his "No. XI." machine, but after flying only 650 feet, the engine stopped on account of too much oil. Shortly after, he remedied this trouble, and then made four excellent circuits of the parade ground at a speed of over 37 miles an hour. The time of the flight was 6 minutes, 11 seconds. There was a gusty wind of from 15 to 20 miles an hour. More lubrication trouble was the cause of his alighting.

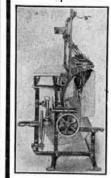
On July 4th Bleriot set up a new record at the Aerodrome at Juvissy. This record was made at an aeronautic meet for the benefit of the many people who suffered from the recent earthquake in the south of France. The flight this day was made with the "No. XI." machine. After making one circuit of the course, Bleriot started upon his long flight. This flight lasted 50 minutes and 8 seconds. It was brought to a close through trouble with the gasoline feed. The flight was made at a height that varied from 50 to 80 feet, and it was the best Bleriot had made up to that time.

On July 9th and 10th, at Douai, he made several flights before 20,000 spectators; but his greatest performance prior to that of July 25th was his cross-country flight of 25 miles on July 13th. This flight from Etampes to within 8 miles of Orleans was accomplished early in the morning and was broken by a descent in a field near Barmainville. The flight was for the "Prix de Voyage." While it was not necessary to make a descent, Bleriot chose to do this so as to show

(Concluded on page 100.)

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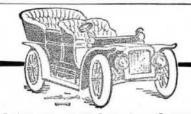


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the practicability of his machine. Soon after he started up again, Bleriot passed Toury and Dambron. As he came in sight of Artenay, which was the half-way point of the cross-country flight last year, a rather strong wind from the west caused him to make a semi-circle. He flew sufficiently high to clear the telegraph wires and then came to earth on the selected spot at Croix-Briquet-Cheville. The start was made at 4:44 A. M. and the landing took place at 5:40. Deducting the 11-minute stop, the net time was 45 minutes and the distance 41.2 kilometers (25.58 miles). The average speed was therefore 34.1 miles an hour. In making this flight Bleriot received a prize of 5,000 francs as pilot and 4,000 france as constructor. The motor manufacturer received 3,000 francs and the designer of the propeller 2,000 francs. All these prizes are conditional upon the performance not being beaten before the first of next January. The practicability of Bleriot's machine is shown by the fact that 35 minutes after he had alighted the machine had been taken apart and shipped back to his factory at Neuilly,

M. Bleriot's two latest aeroplanes have been illustrated and described heretofore in our columns, but it would perhaps be well to give the particulars of these machines again at the present time. The spread of the "No. XI." is 7.8 meters (25.58 feet) and the length of the body 7 meters (22.96 feet). The lifting surface is 14 square meters (150.69 square feet). The machine is equipped with a 3-cylinder Anzani air-cooled motor which weighs 60 kilogrammes (132.27 pounds) complete in running order. A 2.1-meter (6.88-foot) diameter Chauviere wood propeller is driven direct from the motor. Complete with Bleriot (whose weight is said to be 195 pounds) and with fuel sufficient for a two-hour run, the "No. XI." machine weighs but 300 kilogrammes (661.38 pounds). It rises in the air at a speed of 55 kilometers (34.17 miles) per hour when the surfaces are loaded to the extent of 22 kilogrammes per square meter (4.46 pounds per square foot). This is about double the weight carried per square foot of surface by most bi-planes. It is probable that this machine, which is the smallest and lightest that Eleriot has built, is able to raise even a greater weight. It might perhaps carry an extra passenger, although this has not yet been tried. The plane is said to be warpable, somewhat similar to those of the Wright bi-plane. Consequently, there are no wing tips. The "No. XII." monoplane, on the other hand, has rectangular balancing planes attached to the body framework just below the aviator's seat. It is somewhat surprising that planes so near the center of the machine will work satisfactorily for this purpose, but photographs of the "No. XII." making a turn show that it tips very little. Bleriot has two vertical surfaces on each side of the body at the front end and he has also covered the framework about half way back to the rear end and placed a fin keel above it. As a result of all this vertical surface the machine does not tend to skid very much in making a turn, and consequently it does not have to be tipped inward to counteract the effects of centrifugal force.

The "No. XII." monoplane has a spread of 9 meters (29.52 feet) and a surface of 22 square meters (236.8 square feet). It is equipped with an 8-cylinder V-type E. N. V. motor of 30-35 horse-power. The total weight of the monoplane in running order with water in the radiator, but without fuel, is 350 kilogrammes (771.61 pounds). With Bleriot, Santos Dumont. and A. Fournier on board, and with 16; kilogrammes (35.27 pounds) of fuel, the total weight was 560 kilogrammes (1,234.58 pounds). Therefore this machine, which weighs only 350 kilogrammes (771.61 pounds) carried a dead weight of 210 kilogrammes (462.97 pounds). The total weight lifted per square foot in this instance was 5.21 pounds—an altogether unprecedented amount. The machine rises at a speed of 55 kilometers (34.17 miles)

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per hour with 25 kilogrammes per square meter (5.12 pounds per square foot) loading of its single surface. The weight lifted per horse-power varies from 35 to 41 pounds, according to whether the motor is taken as developing 35 or 30 horse-power. This monoplane is therefore by far the most efficient aeroplane flying machine that has ever been constructed.

After his record flight M. Bleriot was presented with a gold medal by the Aero Club of Great Britain and also by the Aero Club of France. A few days before. he and Gabriel Voisin had been awarded the Osiris prize, which is given every three years to the men who make the greatest advance in science. He was also decorated with the ribbon of the French Legion of Honor, as were the Wright brothers. In addition to winning the prize of the London Daily Mail (\$5,000). Bleriot also won a prize of \$2,500 offered by a French wine firm two years or more ago. The Alaska-Yukon Exposition has put up a prize of \$25,000 for a race between Bleriot and the Wright brothers.

ELECTRIC LAMPS IN THE MAKING.

(Concluded from page 89.) the bulb are then joined together. The operation is known as "tubulating," and the tube thus made temporarily a part of the bulb furnishes the means for the removal of the air inside at almost the final stage in the manufacture of the lamp.

With the filament now made and the bulb washed, cleaned, dried, and tubulated, the filament-bearing stem and the bulb proper are assembled at one machine. The operation of sealing these two parts can best be likened to inserting a stopper in a bottle; the bulb being the bottle, and the stem the stopper. A girl inserts this stem into the neck of the bulb, and both parts are revolved on the sealing machine into jets of flame, where they melt together. Knowing the exact amount of glass that must be melted away and the shape the molten glass will assume when it cools, the operative is able to unite the stem and bulb skillfully.

Then the bulb goes into another tray along with other bulbs, and is taken to a girl in the vacuum room. This girl is seated before an earthen pot in which there is a bubbling liquid—phosphorus in a liquid state—which is kept stirred by a jet of water. She takes the bulb, and with a brush hardly larger than a knitting needle coats the air-extraction tube with a phosphorus solution.

After this the bulb is ready for the exhaustion of the air and final sealing. Already the air has been drawn from the bulb several times in the processes of manufacture, but each time the bulb has been left unsealed. It is now ready for the final air test. The tube at the big end of the bulb, through which the air is withdrawn by a most ingenious pump, is to be sealed by melting.

When the bulb is placed in position for exhausting the air, the wires running through the neck are connected with an electric current, which causes the filament to glow. If it were allowed to glow more than a few seconds with oxygen present in the air, the filament would burn up and collapse So, while the tube is connected with the vacuum pump, the operative touches it with a blue flame spray which melts bulb and stem apart, and the melted end next to the bulb draws up and closes automatically, leaving the little point seen in the finished bulb over your desk or table. Before the sealing is completed the light within the bulb has a bluish cast, and this reveals the fact that all the oxygen has not yet been withdrawn from the bulb. It is then that the coating of phosphorus in the air extraction tube plays its part. The heat upon the tube converts the phosphorus into a phosphorescent gas, and this gas, entering the bulb, neutralizes the oxygen in the bulb. Almost instantly the color of the bulb changes from blue to white. In this manner the operative knows that the effect of the oxygen has been overcome.

The hulb is next taken into the photometer room for the purpose of making final tests. It is a large dark room divided into several small stalls. In each stall is an induction coil, from which the bulb is held about two feet away. The induced current from the coil passes through the body of the operator to the bulb, and causes the filament to glow faintly. If the glow is bluish gray, it shows that there is still a leak somewhere; although it may be so infinitesimal that it can scarcely be measured by mils. If the glow is of a purplish hue, it shows that there is air still within the bulb and that the bulb must be further exhausted. This means an operation involving many more handlings.

The next process is the measurement of the bulbs for voltage, a work of the greatest possible delicacy. Two girls, working together, do the measuring. One places the bulb in connection with a current that lights it, and the light from it shines through a small aperture upon a white paper screen. In the center of this screen is a faint star-shaped spot. It requires a certain voltage in the light to bring out this spot.

When bulbs pass the tests and measurements successfully, they are then ready for the appliances with which they are attached to the current-carrying fixtures in general use. They are taken to another part of the factory, where a girl places them in a tray. Threaded brass collars are placed about the necks, and the space between the collars and the necks is filled with plaster cement. The tray revolves through a heating oven that bakes the cement into a hard and holding mass. The ends of the wires running through the necks are cut off: small round brass plates are placed on the ends, the wires are soldered fast, and the lamp is completed.

Once more there is a sort of farewell test for leakages that may have escaped notice or may have developed from the last handlings. This final test is very quick and simple. The sealed ends of the bulbs are held against two electric poles. If the lights are white and perfect, the lamps are considered ready for the last cleansing of the glass, classification, and shipment. Throughout the entire process of development of the bulb into a perfect lamp there are scarcely ever any broken. This is really remarkable when it is remembered that the bulb is not only picked up many times and placed in machines, but is heated and cooled many times.

THE FIGUREHEAD AND ITS STORY.

(Concluded from page 92.)

other meaning of the word dragon denotes watchfulness, so that it is not surprising to find that the drakkars, or dragon ships of the Vikings, generally belonged to their chieftains and were the largest ships in their fleets. The next largest were generally esnekkers or "long serpents" with snake figureheads. In both cases the hull of the vessel played the part of the monster's body, the stern often terminating in a representation of its tail. But although the dragon and serpent were the favorite devices they were not the only ones that did duty at this period as figureheads. When Sweyne, King of Denmark, made a descent on the Norfolk coast in 1004, his own ship "The Great Dragon" was made in the form of the animal whose name it bore, but the bows of the other vessels of his squadron were adorned with the figures of lions, bulls, dolphins, and men, all made of gilded copper.

After the Norman conquest the figurehead disappears from view for some centuries, and it is not until the reign of Henry V that we again find references to its use. Images of the saint after whom a ship was named used, it appears, to be sent on board in the time of Edward III, but there is no record of their having been utilized as figureheads. The ALEXANDER DODDS, Grand Rapids, Mich., U.S. A.

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reason of their temporary disappearance was the gradual changes in the status of navies and in the build of the ships of which they were composed. The fast oar-propelled long-ship, built only for speed and for war, gradually gave place to the round-ship, relying on her sails and built primarily for commerce and the conveyance of mail-clad nobles and their men-at-arms to the country where they intended to carry on a campaign. Fierce sea fights certainly took place from time to time, but for this purpose any ships that could be assembled together were utilized and prepared for action by the addition of stern and fore castles, built-up stages or platforms which overhung the actual stem and stern of the ships and left no place for a figurehead. In process of time the square bow platform or forecastle became triangular and its foremost extremity once more offered a suitable position for the figurehead. Gradually, too, the king became possessed of a certain number of ships of his own, the nucleus of a royal navy. These vessels, though occasionally hired out as merchant ships, were more or less elaborately decorated, and among other decorations the figurehead reappeared. Thus in the year 1400 the "Good Pace of the Tower" had a large golden eagle with a crown in his mouth as figurehead, and in representations of ships during the fifteenth century little, insignificant figureheads are here and there to be met with. The famous "Henri Grâce à Dieu," built in 1514, had a squatting lion as figurehead, while the big French man-of-war "Grande-Françoise," built at St. Nicholas de Leure in 1527, was decorated forward with a salamander above which was placed a statue of St. Francis. The Elizabethan men-of-war seem generally to have been ornamented with figureheads, but with some exceptions they were neither very large nor very noticeable. At this time a long, almost straight projection ran abruptly out from the bow of the ship a little way below the bowsprit. It was very different from the gracefully curved stem which in the seventeenth and eighteenth centuries replaced it and would not, in all probability, support any very great weight at its extremity. Still it often carried a figurehead of sorts. Thus the 'Ark-Royal," Effingham's flagship in the Armada fight, had a mild-looking bird as figurehead. The "Bonaventure" and others had dragons on their beakheads; others had lion figureheads, one, at any rate, being gilded. The "Mary Rose" had a unicorn, the "Swiftsure" a tiger, while the "White Bear" was adorned with "an image of Jupiter sitting upon an eagle with the cloudes." In Holland the "Finis Belli," the earliest ironclad, bore the figure of a man in armor at her bow. About the time of James I equestrian figures were introduced as figureheads, and in succeeding reigns these were surrounded with other figures. forming a most elaborate bow decoration. Thus the famous "Sovereign of the Seas," launched in 1637, had on her beakhead the figure of King Edgar on horseback trampling upon seven kings. The figurehead of the Commonwealth ship "Naseby" was equally exuberant, consisting as it did of the Protector on horseback "trampling upon six nations." It was evidently a colorable imitation of that borne by the "Sovereign of the Seas." Curiously enough this was the ship in which Charles II returned to England at the Restoration. In honor of this she was renamed the "Royal Charles." She was fitted with a new figurehead, which is now in the museum at Amsterdam, the ship having been captured by the Dutch when they came up the Medway. Furtenbach in his "Architectura Navalis," published a few years earlier, gives an engraving of a very peculiar figurehead which terminated the beakhead of a Turkish pirate prigantine of a class known as caramunzels. It is probably intended to represent a drag-

(Continued on page 102.)

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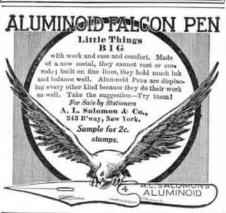
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on's head, and flames are shown spouting from its mouth. It seems possible that some kind of a gun may have been mounted inside the beakhead with its muzzle concealed in the monster's mouth.

The French were always noted for the excellence and beauty of their warships, and it is not to be supposed that their ornamentation was a whit behind that of their English contemporaries. As a matter of fact they were, if anything, the more elaborately decorated of the two, and often expensively gilded.

The lion about this period became as favorite a figurehead in the French and English navies as was the dragon among the Vikings. Sometimes he was rampant and fierce, at others he assumed a calm and majestic attitude. The lion went out of fashion in the French fleet after a short time, but was retained rather longer in the British service and adopted very extensively by the Dutch navy. The "Vreyheid," Admiral Winter's flagship, had a lion figurehead. Later full-length figures, often of a classical nature, emblematic of the name of the ship they ornamented, quite ousted the king of beasts, and these lasted right up to the beginning of the ironclad period between 1860 and 1870. There were a few exceptions to the lions and the fulllength figures that succeeded them, notably the figurehead carried by the "Britannia" of 100 guns in the reign of William III, which was an elaborate representation of the royal arms embellished with scrollwork and other devices, and that which adorned the "Victory" at Trafalgar, which was also the royal arms with the figures of a seaman and a marine as supporters. Some years afterward these were transformed into a pair of cherubs. But the fulllength---or more often the three-quarter length-figure continued to ornament the bows of all classes of men-of-war right up to the beginning of the ironclad period.

The French were ahead of everyone in launching the first seagoing ironclad— "La Gloire." She had no figurehead, but the "Warrior" and the "Black Prince," a pair of sister ships, which England constructed in reply, were ornamented with two of the finest figureheads that have ever been made. But both these ships had overhanging or "swan" bows, while their successors had the ram bow, which did not lend itself so well to this style of decoration, and a shield or coat of arms surrounded with more or less elaborate scrollwork became the vogue for the bows of an ironclad. There were exceptions, of course, especially in ships of low freeboard. Thus, the figurehead of the old "Royal Sovereign" turret ship (which by the way, was an old wooden line-ofbattle ship cut down) was unique in having a lion standing at the top of the stem above the medallion of Queen Victoria, which was below it. The "Rodney" and "Centurion" both had bust figureheads illustrative of their names, while the French battleship "Brennus" was decorated in the same way with a very fine piece of wood carving. At this period there were plenty of small craft among the warships of the world which still preserved the swan bow, and with these the older style of figurehead still preserved its supremacy. H. M. S. "Iris," for instance, had a beautifully designed angel, while the unfortunate gunboat "Serpent," wrecked off the Spanish coast, bore a snake. Toward the end of the nineties the figurehead began to disappear altogether from the British and the French man-of-war. The principal reason alleged for the abolition of the figurehead in England was that it got in the way when rigging out the torpedonet defense, which on its part often damaged the ornamentation, necessitating an expenditure on repairs. Probably the initial cost was also thought to be an extravagance. But the practical and economical Germans have retained the

(Concluded on page 103.)

figurehead in their new and formidable navy and have evolved some very handsome specimens despite the ram bow. What, for instance, could be more decorative and appropriate than the fine figure of Germania on the bow of the "Deutschland," one of their very latest battleships? The scrollwork on the cruisers "Bismarck" and "Eber" is also very artistic. The probability is that the German Admiralty regards esprit-decorps as a very valuable and practical asset and thinks that nothing is illspent which in any degree serves to stimulate this feeling. Certainly in the old days seamen venerated the figurehead of their floating home in much the same way that a regiment adores its special and distinctive badge. "So, now, my lads," said Capt. Hall when in command of a frigate on board of which there was an epidemic of bickering and quarreling among the ship's company, "if this be not put an end to, and hearty good-will restored, I'll blacken your figurehead and put the ship in mourning." The threat had a most salutary effect, and the handsome bow-ornament shone resplendent to the end of the commission.

In the far East the Japanese and Chinese have one uniform bow decoration for their men-of-war, the former using a conventional representation of the Imperial chrysanthemum and the latter the national dragon with the head of a camel, the horns of a deer, the eyes of a rabbit, the ears of a cow, the neck of a snake, the belly of a frog; the claws of a hawk, and the palms of a tiger.

In the United States the figurehead has followed much the same lines as in Europe. That of the "Chesapeake," famous for her duel with the "Shannon," can be seen in the gardens of Ashford House in Woolmer Forest. That of the "Delaware," representing the Indian chief Tecumseh, is in the grounds of the naval academy at Annapolis, and is saluted by every cadet when he passes it, lest haply the omission to do so should bring him ill-luck in the passing-out examination. Though not on so elaborate a scale as in the German navy, the United States ships, even of the newest types, are still decorated with scroll-work at the bow and in some cases a new departure has been made in placing a handsome fulllength figure or figures of bronze on the foremost turret between the two bow guns. The "Massachusetts," for instance, has a most handsome and decorative figure of a Winged Victory which was presented to her by the State whose name she bears, while the "Kearsarge" and "Alabama"—whose former namesakes fought so desperately with each other off Cherbourg in 1864—have similar decorations symbolizing in the figures the North and South clasping hands, a reunited country.

This seems an excellent idea and one that might well be followed in all navies. A bronze figure on the foremost turret would more than replace the figurehead of former days. It would, unless destroyed in action, be practically everlasting and be passed on from one ship to its successor of the same name. It would be a far better and more appropriate heirloom than the services of plate which it is becoming the custom to present to various ships. Being carried inboard in stead of outboard it can be seen and admired day after day by the ship's company, which was not always the case with the figurehead even in its palmiest epochs. May we in conclusion express a hope that the time-honored figurehead may in this form rise "phœnix-like from its ashes" and be once more promoted to a place of honor in the world's war navies?

A 7-foot flywheel upon a Russel engine went to pieces the other day at the statron of the Allegheny Valley Lighting Company, at Creighton, Pa., causing about \$3,000 worth of property damage, but no personal injuries.—Power and the Engineer.

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