THE CHRONOSPHERE—AN EMPIRE CLOCK.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

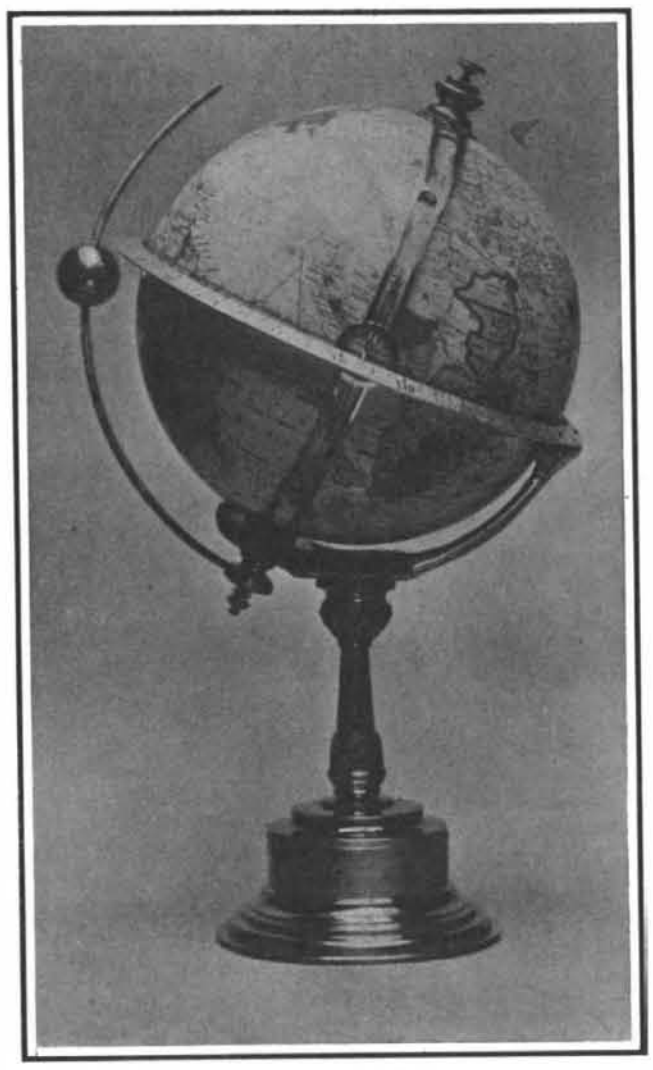
The accompanying engraving illustrates an ingenious and useful horological novelty that has recently been perfected by an English inventor, Mr. J. H. Overton, and which is described as an Empire clock. As the name implies, it is a universal timepiece, for not only does it give the correct time all over the world, but supplies in a glance the difference in the times between all places on the earth's surface and the correct mean time at any town or place in the eastern or western hemisphere. Moreover, it demonstrates the actual rotation of the earth on its axis in the twenty-four hours, as well as the actual speed of the earth.

The clock is made in two sizes and patterns, but the principle of design and operation is fundamentally the same in both instances. There is a terrestrial globe inclined at 23½ degrees similar to that used in schools and suitably mounted. The diameter of this glove varies from 3 to 4 inches, according to the size of the clock. It completes one revolution about its axis in the course of twenty-four hours in the same direction as the earth itself revolves. Parallel with the equator is a fixed ring dial upon which are inscribed the numerals representing the twenty-four hours with sub-divisions, the hours from 6 P. M. to 5.45 A. M. being engraved in black, and from 6 A. M. to 5.45 P. M. in red, to distinguish the twelve hours before and after meridian. The meridians of longitude are 15 degrees apart. When any meridian is adjusted to its own mean time all the other meridians denote their own mean time and each meridian will continue to do this correctly throughout the twenty-four hours. In order to determine conveniently the time at any desired spot on the earth's surface relative to another point, such as New York, there is an adjustable and movable guide fitted with a pointer which turns with the globe, and whereby the time is indicated in the hour ring just as the hand of an ordinary clock at any place. This guide is held in position by means of a small knob which enables it to be turned in an easterly direction without moving or changing the position of the globe, and it can be set over any town where the chronosphere is to be permanently used. As an example, the clock is installed in New York and it is desired to ascertain the relative time in London when it is 12 noon in the first-named city. The guide is set to stop over New York, and the pointer indicates this city's mean time. The guide is moved eastward until it is brought over London and the hour 4:46 P. M. is instantly shown on the ring dial. The guide is then turned eastward and brought over New York, upon reaching which point it will stop and click, denoting that it is over the place at which it is adjusted for permanent use, when it again indicates correct New York time. The guide is easily adjusted to stop over any part of the globe where the timepiece is permanently used.

In the second type of chronosphere the terrestrial globe is of 8 inches diameter and it indicates the relative times between any two places. In this case the globe should be secured in the manner later explained before the guide is moved. For instance, the chronosphere is permanently used in London. It is 1 o'clock there, and it is desired to ascertain what would be the time in Pekin when it is 3 o'clock in Vienna. The pointer is set to indicate 1 o'clock in London, and the guide is brought over Vienna. The globe is then turned together with the guide by means of the milled screw at the top of the sphere, until the pointer indicates 3 o'clock on the hour ring. By tightening the milled screw, the globe is then secured in that position so that it will not revolve in either direction—east or west—and the guide is then turned until it is exactly over Pekin. Instantly the pointer indicates the Pekin time on the hour ring when it is 3 o'clock in Vienna. The top screw is released and the guide is carried eastward, until it is brought over London, when it stops. The milled screw at the top of the globe is released and the latter rotated in an easterly direction until it stops itself, so that the pointer once more indicates actual London time, that is 1 o'clock, plus the minutes that the experiments have occupied in determining the relative times between Vienna and Pekin.

The globe mechanism is so designed that after displacement from local time in order to carry out any such investigations as are described above, it will when brought by the hand back to the local time, stop itself in the correct position for the pointer to indicate actual local time once more. If desired the guide can be easily adjusted for merely permanent use as in the smaller model. Moreover, if required, a sun attachment can be fixed in position, whereby the height of the sun in degrees above the horizon is shown for every day of the year. This fitting renders the clock capable of more extensive use in schools and colleges. The total heights of the two models are 12 and 15½ inches respectively, so that they occupy but a small space. It is only necessary to bear in mind that the guide and the globe must be turned in an easterly direction only, and when setting time, to exercise care that the guide be over the place at which it is adjusted for permanent use, and that the globe has been turned eastward until it has come to a stop.

For schools and colleges the clock is especially useful, since it enables one to demonstrate in the concrete the daily rotation of the earth from west to east, the difference in time arising from such rotation corresponding to the difference in longtitude, that is 15 deg. longitude east or west, one hour's difference, or four minutes for each degree east or west of the standard meridian; and the exact relative position of every place in the world and its exact position at any time in relation to the light of the sun, that is by day or night, as well as certain phases of solar phenomena by means of the sun attachment. The clock requires winding only once a week, and its steadiness and accuracy in running are distinctly noticeable features. It should prove of marked utility to steamship and railway companies as well as to other commercial enterprises having an extensive trade overseas.



THE CHRONOSPHERE.

Showing time ring, pointer or hand of clock, and sun attachment.

THE FIGUREHEAD AND ITS STORY.

From time immemorial the seagoing vessel, whether a creation of wood and hemp or of iron and steel, has presented herself as an almost human individuality to the eyes of her crew. From the earliest ages those little differences between craft of the same type which are only perceptible to the trained eye of the seaman were recognized to be insufficient to distinguish one individual ship from another. Hence ships were variously ornamented and named by their owners and commanders, who frequently adopted one of the numerous deities of heathen mythology as especial protector of their vessel and of those who intrusted themselves and their fortunes to its keeping. As in almost every branch of antiquarian research, we look to the ancient Egyptians for the earliest information on the subject. These wonderful people were among the very first recorded ocean travelers, and shipbuilding with them had at an early date quite attained the proportions of an art. Many of their boats were elaborately painted and decorated and among their decorations the figurehead stands out somewhat prominently. The sacred ibis, the lotus, and the phœnix were favorite designs; sometimes placed on the raised-up prow itself and at others rather behind it as in the one illustrated. Note the huge eye that is painted on the bow just below the figure. This peculiar badge is very illustrative of the general feeling that a ship is endowed with a personality of its own, and in one form or another it has maintained its position on the bows century after century up to the present day, in which it is often seen on the bows of Maltese *dysos* and other gaudily painted European craft, to say nothing of its almost universal use in China. "If no have eye, how can see?" asks the Chinese sailor; and the expression "Right in the eyes of her" is still usual afloat among our own seamen, meaning as far forward in the ship as possible. The ships of the Greeks and Romans preserved the "eye" on their bows and carried a distinguishing emblem or figurehead (*parsemon*) at the bow while their tutelary deities were generally given a billet at the stern. All these vessels had their distinguishing devices and figureheads in addition to which those named after mountains and rivers had a lion or a crocodile respectively painted or carved in relief on either bow. Numbers of representations of these may be seen on old coins.

A special class of Phœnician vessels had a figurehead representing a horse and were therefore known as *hippi*, the idea of riding over the sea as on horseback being evidently the origin of the adornment. It is interesting to note that in the year 112 B. C. one of these figureheads was found thrown up on the east coast of Africa and brought to Egypt, strong circumstantial evidence that some early Phœnician mariners had already doubled the Cape of Good Hope.

Ramming being the most usual form of attack among the ancients in their sea engagements, the bow decoration often took the form of the head of a ram or of a wild boar, the well-known butting tactics of these animals rendering the figure very appropriate.

When Rome in the days of her decadence lost the command of the sea the most formidable navies were those of the Scandinavian sea robbers, the famous Vikings. The term "Viking," by the way, has nothing to do with the English word king, as is often supposed, but is derived from *vik*, a creek or fiord, and *ing*, meaning "the son of." The word thus should be translated "the sons of the fiords"—a very good descriptive name for these Norse sea rovers. Their vessels—the famous long-ships—were adorned with figureheads. But the Viking's conception of this form of ship ornamentation started from a standpoint quite different from that of the ancients. It was not so much a distinctive design or a religious emblem. Its intention was to strike terror into an enemy. What form of reasoning led up to it is well described by Baring-Gould in his "Strange Survivals and Superstitions":

"In the Egil's Saga, an old Icelandic chief is said to have taken a post, fixed a horse's head at the top, and to have recited an incantation over it which carried a curse on Norway and the king and queen; when he turned the head inland it made all the guardian spirits of the land to fly. This post he fixed into the side of a mountain with the open jaws turned toward Norway. These figures were called *nith-stangs*. The *nith-stang* was primarily the head of the victim offered in sacrifice, lifted up with an invocation to the god to look on the sacrifice, and in return carry evil to the house of all who wished ill to the sacrificer.

"The figurehead of a warship was designed in like manner to strike terror into the opponents and scare away their guardian spirits. An Icelandic law forbade a vessel coming within sight of the island without first removing its figurehead, lest it should frighten away the guardian spirits of the land."

Here, then, we have the *raison d'être* of the Viking figurehead, and the annexed reproduction of an old drawing in Strutt's "Chronicle of England" shows not only a figurehead of this period but actually a *nith-stang* in combination with it.

It is obvious that the word head comes directly from the *nith-stang*, and although the advent of Christianity abolished the barbarous form of witchcraft which it exemplified, yet the figurehead and hence the "head" of the ship remain terms in constant use to this day. In the drawing referred to it will be observed that the actual bow terminates with the head and neck of some animal which is probably intended for a dragon. This fabulous monster has always been a favorite emblem in all ages and from China to Wales, in both of which widely separated countries it occupies a prominent position in the national heraldry. In all cases it probably has been taken as the symbol of malevolent power capable of inflicting evil upon the human race. In the Bible the dragon is always represented in this light, and its wings, serpent form, claws, and fire-spouting mouth render it formidable in "the air above, the earth beneath, or in the waters under the earth." With the *nith-stang* theory before us we can well understand the old Scandinavian sea-rovers being very partial to its use as a figurehead. The dragon, too, from its power was also frequently adopted as a mark of chieftainship or sovereignty. It was the badge of the famous King Arthur, the ensign of the Merovingians and of the Saxons at the battle of Hastings. An-

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knows that the effect of the oxygen has been overcome.

The bulb 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 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 brigantine of a class known as *caramunzels*. It is probably intended to represent a drag-

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Ring travelers, holding and delivering means for, L. S. Burbank 928,303
Riveting machine, J. A. Mosher 928,783
Rock cutting apparatus, F. W. Allan 928,574
Rolling mill, H. Keitel 928,768
Roofing nail, J. Conway 928,630
Rotary engine, L. L. Driggs 928,506
Rotary motor, M. Naeder 928,270
Rubber spading boot, Van Denburgh & Glissmann 928,718
Rudder, jury, W. Manwaring 928,612
Safety device, W. Cooper 928,903
Safety stop signal, automatic, W. E. Adams 928,834
Sash balance, adjustable, E. M. Erb 928,644
Sash lock, A. A. Solaway 928,339
Sash lock, R. Taube 928,408
Sash operating and locking mechanism, R. H. Jones 928,767
Sash support, window, N. H. Conger 928,362
Screen. See Glass shade screen.
Screen, N. Ellwart 928,643
Screw thread cutting mechanism, Allen & Henry 928,489
Scythe snathe, J. N. Radcliff 928,883
Seal and lock, window or door, C. E. Lahart 928,466
Sealing device, bottle, R. V. Lyon 928,872
Sewing machine ruffler, W. R. Parsons ... 928,792
Sewing machine tuck creaser, F. W. Beckert 928,838
Sewing tool, C. E. Betts 928,424
Shade and curtain pole bracket, adjustable, A. L. & C. L. Renzenbrink 928,329
Shade bracket, H. Wittmann 928,829
Shade bracket and curtain pole support, combined, R. B. Jefferey 928,522
Shade fixture, window, D. Hoyt 928,864, 928,865
Shampoo tray, C. B. Lovett 928,313
Sharpener, file, J. C. Rink 928,331
Sharpening, file, J. C. Rink 928,331
Sharpening machine, saw, G. H. Robinson .. 928,332
Sheet feeding device, F. B. Davidson 928,637
Sheet metal structures, uniting the component parts of composite, A. F. Rietzel 928,701
Sheet metal wheel, sectional, J. F. Craven. 928,633
Shingles from paper pulp, apparatus for making, J. T. Collins 928,501
Shoe polishing machine, E. F. Stratton 928,341
Shoe rack, W. F. Atwood 928,419
Shovel, A. Schultze 928,283
Shuttle operating device, G. Schwabe 928,802
Sign board structure, M. P. O'Brien 928,534
Sign, illuminated letter, C. H. Hulse 928,309
Signal, Kennedy & Gleason 928,666
Silicon nitrid, manufacturing, A. Sinding-

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 full-length 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 full-length—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-of-battle 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 torpedo-net 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-de-corps* as a very valuable and practical asset and thinks that nothing is ill-spent 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 full-length 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.

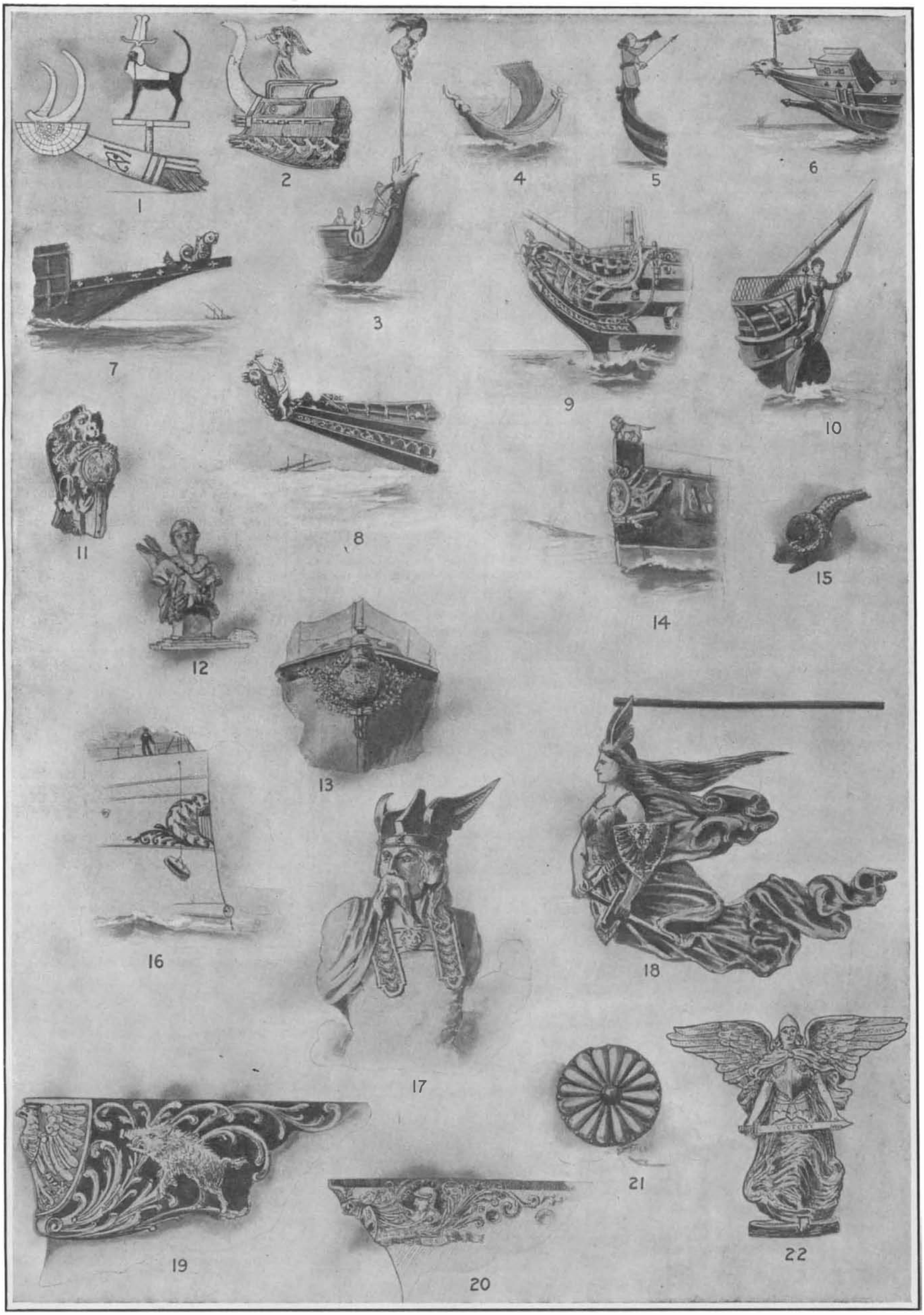
This seems an excellent idea and one that might well be followed in all navies. A bronze figure on the foremost turret would more than replace the figurehead of former days. It would, unless destroyed in action, be practically everlasting and be passed on from one ship to its successor of the same name. 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 instead 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 station 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.

Larsen	928,476
Single phase commutator motor, V. A. Fynn	928,438
Sink, washtub, and similar article, F. H. Caldwell	928,425
Skate, J. E. Martin	928,528
Skirt gage, J. D. Ball	928,239
Skiving machine attachment, G. A. Henderson	928,755
Smoke producing device, H. & R. Pinegar	928,695
Snow plow for sidewalks and highways, W. W. Cowan	928,363
Sound producing instrument, F. Gottschalk	928,651
Sound reproducing machine, J. Wellner	928,567
Sparker, G. A. Weidely	928,484
Speaking tube, W. F. Simpson	928,554
Speed changing mechanism, W. O. Foss	928,648
Speed controlling mechanism, A. M. Wolf	928,727
Speed indicator, Dahl & Martin	928,635
Speed mechanism, variable, A. G. Mather	928,679
Spinning or twisting machine, W. P. Wood	928,830
Square and bevel, combined, E. A. Williams	928,569
Stamps to lecters, device for affixing postage, A. Tebbit	928,713
Stave formed structure, machine for tying bands in, D. E. Vanvactor	928,290
Stave punching machine, D. E. Vanvactor	928,289
Steel toughening, S. S. Wales	928,347
Stove attachment, gas, H. Knudsen	928,770
Stove, heating, E. R. Cahoone	928,737
Straightening machine, E. A. Lane	928,672
Strainer, sink, A. W. Andrews	928,236
Stud or button, E. L. Anderson	928,622
Suit case handle connecting device, G. W. Wood	928,619
Surface indicator, F. Brink	928,492
Suspenders, J. Weis	928,722
Sweeping machine, J. O. Johnson	928,456
Swing gate, Kendrick & Carroll	928,387
Tanks or cans, safety attachment for, N. B. Ippolito	928,660
Tapper, beer, R. B. Spikes	928,813
Tare weight, J. W. Ford	928,745
Telegraph and telephone wires, guard for, C. J. Elliott	928,431
Telegraph pole, W. H. & H. R. Smalley	928,478
Telegraph sounder intensifier, R. W. Crawford, et al	928,589
Telephone system, D. W. May	928,680
Telephones, sanitary guard for, S. E. Florsheim	928,373
Telephonic apparatus, E. A. Graham	928,862
Telescope mounting, F. L. Smith	928,555
Tent, folding, H. G. Hergelroth	928,448
Tent pin or anchor, J. F. Miles	928,469
Textile fabric, J. G. Elliott	928,642
Thread, spool of, J. J. Drury	928,507
Tie plate, J. H. King	928,869
Tile, H. C. Moore	928,320, 928,321
Tile and sewer outlet protector, drain, O. A. & J. A. Tenold	928,481
Tins or canisters for preserves, apparatus for flanging, A. Wilzin	928,618
Tire armor, pneumatic, C. E. Evans	928,433
Tire, non-skid, E. Kempshall	928,868
Tire setter, H. M. Lourie, et al	928,264
Tire signal, pneumatic, Silverman & Trahan	928,553
Tire, vehicle, W. A. Koneman	928,611
Tire, vehicle, M. Behrer	928,731
Tire, pneumatic, R. J. Ruths	928,334
Tires, gaiter or patch for repairing pneumatic, H. Maries	928,678
Tires, etc., hose connection for wheel, E. J. Rohrbacher	928,797
Tires, valve for pneumatic, G. De Vigne	928,411
Toilet case, E. B. Pike	928,694
Tongs, A. G. Carlson	928,849
Top, Gropper & Schmidt	928,257
Towing post, W. F. Johnstone	928,766
Toy, O. S. Meyer	928,777
Toy, figure, W. H. Fisher	928,744
Traction wheel, N. Campbell	928,848
Train stop, time limit, W. Brewer	928,355
Trains, means for controlling the operation of, J. F. & J. F. Webb, Jr.	928,350
Trap, J. C. Wood	928,352
Trap, D. Morgan	928,395
Trolley, F. Kompe	928,668
Trolley base, C. E. Gierding	928,442
Trolley pole controlling means, C. E. Cozzens	928,306
Trolley pole for electric railway cars, T. Oliver	928,879
Trolley switch plate, E. Bell	928,839
Trunk, J. Finzler	928,743
Trunk lock, H. W. Cottrell	928,904, 928,905
Tube cleaner, W. S. Elliott	928,432
Tubes, bottles, etc., closure for collapsible, Pike & Hayne	928,692
Tumbling apparatus, Patterson & Boax	928,399
Turn table, M. J. Leonard	928,675
Typewriter, telegraphic, E. Burlingame	928,581
Typewriting machine, C. Delvigne	928,591
Typewriting machine, A. T. Brown	928,627
Typewriting machine, J. C. Doane	928,856
Typewriting machine, H. S. McCormack	928,876
Typewriting machine, J. C. McLaughlin	928,877
Typewriting machine, E. L. Pfunder	928,882
Umbrella, folding, J. Charlesworth	928,426
Umbrella window, G. R. Livergood	928,774
Valve, C. G. Harcourt	928,751
Valve, J. Stevison	928,815
Valve, D. F. Morgan	928,874
Valve, automatic intermittent flushing, H. A. Kieselhorst	928,459
Valve, gas, J. Melnik	928,316
Valve operating mechanism for internal combustion engines, S. Loffler	928,390
Valve operating mechanism, furnace, J. W. Seaver	928,403
Valve, regulating, H. C. Benwitz	928,732
Valves, disengaging device for motor driven, Ward & Yerrick	928,720
Vault, burial, S. E. Burke	928,847
Vaults, mold for concrete burial, M. J. Demorest	928,638
Vehicle, B. Tippmann	928,564
Vehicle cushion wheel, F. Groff	928,601
Vehicle spring, Bollbach & Waindzioch	928,242
Vehicle top, foldable, W. S. Butler	928,584
Vehicles of any kind, antivibration device for, G. Huysmans	928,520
Vehicles, stalk cutting attachment for, R. B. Human	928,759
Velocipedes, pumping device for, P. G. Larsson	928,919
Vessel lid holder, R. M. Dixon	928,855
Vessels, apparatus for elevating submerged, G. Pino	928,536
Vinegar, making, W. Antoni	928,578
Wagon box, drop, A. T. Cyr	928,503
Wagon, dumping, G. M. Head	928,753
Wagon jack, A. A. Roon	928,587
Washing machine rake, A. C. Sargent	928,336
Water closet fastening device, J. F. Kelly	928,523
Water cooler, W. G. Eads	928,908
Water distributer, W. C. Johnson	928,386
Water gage, C. Carlson	928,304
Water heater, F. A. Knapp	928,261
Water heater, H. S. Humphrey	928,310, 928,311
Water heater, J. W. Ellebrecht	928,859
Water heater, automatic, R. Hoffman	928,757
Wedge, ax and tool handle, G. P. Morrill	928,322
Weighing machine, K. Bottcher	928,491
Wheel attachment furrow, L. J. Hamilton	928,446
Wheel lock, hand, Ward & Yerrick	928,893
Whetstone, blotter, and ruler, combined, E. B. Pike	928,963
Whip socket, J. C. Feickert	928,370
Windlass, C. H. Richardson	928,336
Window and door screen, A. C. Davis	928,366
Window, flexible, W. E. Walsh	928,349
Window pane fastener, A. E. Cherry	928,359
Window screen, W. A. Loper	928,526
Wire rope clamp, C. C. De Witt	928,367
Work clamp, H. Howell	928,657
Wrench, A. Frick	928,375
Wrenches, pipe-gripping attachment for monkey, F. Gorman	928,444
Yarn, W. P. Wood	928,831

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.



1. An ancient Egyptian figurehead. **2.** The bow of a Greek galley, B. C. 294. **3.** The *nith-stang* of the Vikings. **4.** A Saxon dragon-ship. **5.** Figure on the "Mora," the ship in which William the Conqueror crossed to England. **6.** A seventeenth-century Turkish *caramunzel*. **7.** Italian war galley of seventeenth and eighteenth centuries. **8.** Figurehead of "La Couronne." 1661. **9.** The bow of the "Fighting Temeraire." **10.** H. M. S. "Queen," 1794. **11.** Figurehead of the "Vriheid," eighteenth-century Dutch ship. **12.** Figurehead of U. S. frigate "Tecumseh," now at Annapolis. **13.** Figurehead of H. M. S. "Centurion." **14.** The bow of H. M. S. "Royal Sovereign." **15.** H. M. S. "Serpent." **16.** Bow of U. S. S. "Castine." **17.** Figurehead of French battleship "Brennus." **18.** "Germania" at the bow of the German battleship "Deutschland." **19.** Bow of the German gun-vessel "Eber." **20.** Bow of the German cruiser "Bismarck." **21.** A Japanese chrysanthemum from the battleship "Asahi." **22.** Bronze Victory on U. S. S. "Massachusetts."

THE FIGUREHEAD AND ITS STORY.

A Partial Solution of the Problem of Tele-Vision.

BY OUR BERLIN CORRESPONDENT.

The problem of tele-vision has long been a favorite one with enterprising inventors. The many telephotographic apparatus which have been made known in the course of the last few years are the outcome of their endeavors. But the transmission of photographs, drawings, and handwriting over a telegraph wire is incomparably more easy than the instantaneous rendering of the moving objects situated at the transmitting station.

It is true a solution of the problem could be attempted on the very principle underlying the construction of these tele-photographic apparatus. The various sections of a picture would be produced—not successively, as in the case of tele-photography, but simultaneously, as well as instantaneously, without any lag, and would become visible immediately without any photographic process. There are two difficulties in the way of a practical realization of this idea, viz., (1) the extraordinary costliness of such an outfit; (2) the sluggishness or inertia of the vital organ of most systems, viz., the photo-electric selenium cell.

Mr. Ernest Ruhmer, of Berlin, well known for his inventions in the field of wireless telephony and telegraphy, has succeeded in perfecting what is probably the first demonstration apparatus which may be said actually to solve the problem. The writer has had an opportunity of inspecting this curious machine immediately before its being sent to Brussels, in order there to be demonstrated before the promoters of the Universal Exhibition planned for next year. In fact, a complete and definite tele-vision apparatus, costing the trifling sum of one and a quarter million dollars, is to be the *clou* of this exposition. The demonstration apparatus has been produced at a cost of $1,250, and by reason of its more elementary construction, lends itself only to the reproduction of the pattern, consisting of squares arranged in different combinations.

The pattern is thrown on a screen hung on a wall, which screen is a square divided into 25 square sections. Behind each of these sections is arranged a highly sensitive selenium cell in which, by a novel process, inertia has been eliminated so far as possible. It thus responds instantaneously to any variation in lighting it is exposed to.

At the receiving station is arranged a similar screen, divided into the same number of sections, each of which communicates with the corresponding section on the transmitting screen. While the actual system used in transmission is kept secret, this much may be stated, that a highly sensitive mirror galvanometer reconverts the fluctuations of current produced by fluctuations in luminous intensity on the transmitting screen, into corresponding light-variations. An accumulator battery supplies current to the tele-vision circuits.

As soon as a perforated pattern is inserted in the projector, a telegraphic reproduction of the picture appears at the very moment it is thrown on the transmitting screen. The sluggishness of the cells has been overcome to such a degree that the telegraphic picture will respond practically instantaneously to any motion. In fact, a reproduction obtained at most in a few minutes with the photo-telegraphic apparatus so far constructed is here achieved in a fraction of a second, so that several phases of a motion can be reproduced within a second.

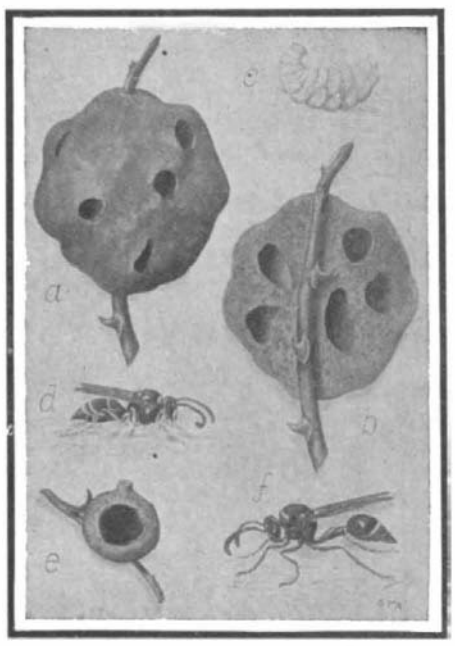
It is hard to realize what an amount of laborious work has been expended in constructing even this comparatively simple apparatus. In fact, each section, with its selenium cell and mirror galvanometer device, is an instrument of precision in itself, while the final apparatus will be composed of 10,000 elements of the same kind. Each selenium cell will have to be wound personally by the inventor, who never intrusts this work to anybody else.

Drawn glass is constantly becoming more widely employed in machine construction because of its extraordinary strength. It is little affected by sudden change of temperature, and resists the effect of fire, heavy loads, and violent shocks. Tests of the effect of loads show the great influence of the thickness of the sheet of glass, a variation of 1/25 inch producing a considerable change of strength. Glass broken by overloading exhibits numerous cracks radiating from the center to the edge. In regard to the fire-resisting qualities, official tests are made at Breslau by the following method: The glass is first heated during 87 minutes, then it is sprinkled 1 minute, and receives the impact of a strong jet of water for 2 minutes. The glass is required to show no crack under this treatment. Drawn glass is easily cleaned and transmits much light. It is made in sheets about 1 1/3 inches thick, measuring about 9 by 10 inches and 13 by 14 inches, and capable of supporting, respectively, 23,000 and 30,000 pounds per square inch.

THE CEMENT WORK OF THE MUD WASPS.

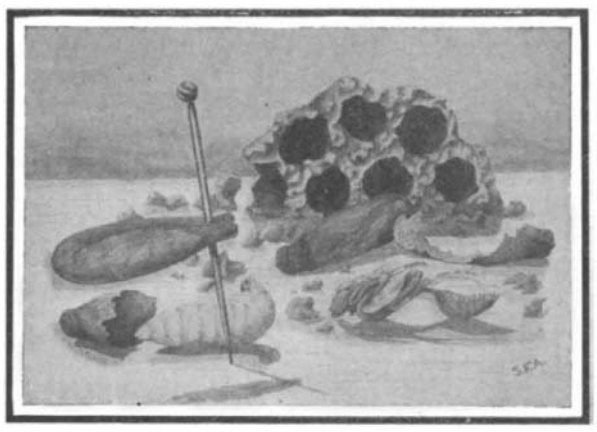
BY S. F. AARON.

The cocoon-making habit is so common with insects, that there are only comparatively few species that do not possess it in some form or other. It amounts simply to making use of a salivary secretion, which hardens and toughens upon exposure to the air. Silk is a common illustration, and the spider web is similar, though spun from the posterior of the animal. Many insects spin this thread-like substance; others spread the saliva as a coating within the larval cell or boring; still others make an independent, parchment-like cocoon within the larval cell. Many Hymenoptera, as the bees, social hornets, ants, mason wasps, etc., commonly employ the last method. Many species of most orders use the salivary secretion as a glue, and remarkable illustrations of this can be seen in caddis fly cases under water, for the saliva is cold waterproof when hardened. An effect of warm water upon the insect salivary secretion is commonly illustrated by the reeling of silk from cocoons softened in warm water, and any insect cocoon is so affected.



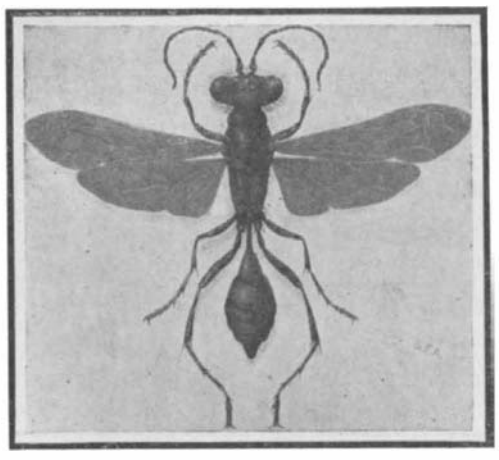
The mud mason wasps and their nest.

a is the bulky stone-like nest construction of a species of Odynerus and from which the adult wasps have escaped; *b*, same broken open showing cells within, natural size; *c*, larva, and *d*, the adult insect that makes the nest, both enlarged, the latter brown with yellow markings. The jug-like single cell of *Eumenes fraterna* is shown at *e*, natural size; *f*, the wasp, much enlarged. The colors are black or brown with pale yellow markings.



A broken nest of blue mud dauber wasp and the larva, pupa, and cocoons taken from it.

The nest is the work of the adult wasp. The cocoons, brown and parchment-like, are the work of the full-grown larvæ and within which they go through their further transformation.



The common blue mud dauber wasp, Pelopæus cœruleus.

The color of the insect is a bright metallic or steel blue, the wings clouded. The body is about ¾ inch long. An allied species, *Sceliphron cementarius*, with similar habits and as common, is brown with yellow markings.

THE CEMENT WORK OF THE MUD WASPS.

The mason wasps, superior in construction to the mere hardening of mud put together when moist, was always a mystery to the writer until after watching a blue mud dauber wasp at work on the habitation for its offspring.

The wasp makes certain off motions with its head close to its work after adding the mud in its proper place, and it was evident that this was a gluing operation for the purpose of holding together the particles of earth. Upon closer examination, immediately after the wasp had finished a portion of its work, it was found that the clay was slightly sticky, as if a viscid material had been mixed with it. Finding where the wasp obtained its clay, I procured a bit of this, and forced it together on a smooth surface in such a way that it would be under no strain and would naturally adhere, then dried it carefully in the air, and found that it by no means made as strong a substance as the wasp's nest. Another experiment was to drop part of a mud nest into hot water, and the other part into cold water, and note the result. The latter piece merely softened but remained intact after soaking for nearly half an hour, while the other in part disintegrated, showing the presence of the salivary secretion through the clay. Upon taking a piece of this dissolved nest and forming it as the raw clay above mentioned was formed, it was found that the material adhered far more strongly when dry. The salivary secretion, therefore, is probably through the clay and within the cells of certain species, and makes the lining thereof. In what manner, however, the small and slender-bodied wasp can secrete sufficient saliva to glue together the numerous particles of its bulky mud nest is beyond understanding. Waterproof animal glue in very small quantities, mixed with clay or sand, makes a material hard to surpass for the purpose needed. The clay nest of a species of Odynerus saddled on a twig or vine in the woods is almost like a stone, and even harder than many sandstones, and is impervious to the water. It is difficult to understand how the little wasps can burrow out of the cells when sufficiently warm weather has brought them through their transformations.

An Electric Rat Destroyer.

A new method for destruction of rats by the electric current has been lately put in use by the municipal electric station of Charlottenburg, near Berlin. The method is a patented one, and is invented by M. Von Biederheim. A special kind of trap on the electric system which was constructed is said to give very good results. The current used in this case is three-phase current, working at a tension of 120 volts, which voltage seems to be sufficient to kill the rats. Direct current at 220 volts can also be employed. The animals to be destroyed, rats, mice, etc., are attracted by bait and enter the trap. By doing this they close a circuit which turns on the current. A set of wires is arranged so that they come in contact with the animals. The creatures are killed instantly. There is no appreciable combustion in the present device. A number of appliances of this kind can be mounted together in a large box. At the electric traps it is advisable to use a method of a special contact which is put on and rings an electric bell or lights a lamp so that it can be noticed when to readjust the trap.

To Distinguish American from Russian Petroleum.

American petroleum can easily be distinguished from Galician and Russian petroleum by the action of colorless nitric acid; that is to say, acid which is not colored yellow by nitrous fumes. The acid should have a density of 1.4 and should have been freed from nitrous vapor by heating it with a little urea. Equal parts of acid and petroleum are mixed in a cylindrical glass jar provided with a ground glass stopper. The mixture is shaken violently for a minute or two. American petroleum assumes a violet color, while the acid upon which the oil floats becomes yellow. Galician and Russian petroleum, on the contrary, turn yellow and the acid becomes brown. When all three varieties are mixed together, the mixture first assumes the violet coloration, which changes suddenly to yellow after long agitation. The reaction is so sensitive that the presence of 10 per cent of Galician petroleum in American petroleum can be detected.