CURIOUS AND INTERESTING WATCHES.

A watch made entirely of iron, of comparatively crude but still most interesting workmanship, is shown in the central picture herewith, its engraved dial marking the hours from 1 to 24. There are two hour circles, an outer and an inner one, and the watch has an hour hand only. It is of the type known as saddle watches, and has both a barrel and fusee, being probably one of the oldest specimens of a watch with this maintaining power, according to the American Jeweler, to whom we are indebted for illustrations and details.* A catgut string is used in lieu of a chain for connecting the barrel and fusee, and the balance is in the form of a straight bar, like those found in old Black Forest clocks, instead of the circular balance now in use. The edge of the case, which was evidently cast and then chased and finished, has an artistic frieze, the motive being birds and foliage. The watch is apparently of German workmanship, and probably more than three hundred years old.

The egg-shaped watch, shown in side and face views, at either side, was made by Denis Martinot, Paris, in the 16th century, and is of gilded silver. Its dial illustrates the three elements, air, water and earth. Jupiter, sitting on his throne and surrounded by clouds, represents air; Neptune, holding aloft his trident in his right hand, inside the dial circle, simulating water; while below the dial reclines a mythological figure designed to represent the earth. Surrounding these figures is a delicate design of conventionalized leaves and flowers. On one side of the case is represented Fame holding a laurel wreath, while opposite is the reclining figure of a warrior, and between them is a drum and antique shaped gun. On the other are other reclining figures representing a herald and the god of war. The watch has an hour hand only, and the movement is richly ornamented to correspond with the case.

CURIOUS AND INTERESTING WATCHES.

THE TYPEWRITER TELEGRAPH.

The quick transmission of news has become one of the most imperious needs of our age. The public wishes to be informed at every instant, and in as short order as possible, as to the most recent occurrences of every kind. To cite but a few examples, we may mention as particularly interesting the mind of the public the races, the various sports, stock operations, political events, etc. The present means that we have at our disposal in Paris for obtaining information are really inadequate, and the telephone itself has not been able to remedy the matter. It became necessary to adopt other arrangements in order to meet the requirements of the present hour.

The Havas agency at Paris has been endeavoring to find a solution of this difficult problem for ten years past, and has finally cast eyes upon a printing telegraph invented by Mr. Wright, an American. This telegraph permits of reproducing at a distance the matter printed by a typewriter. Our engraving represents the latter in the foreground. The manuscript to be transmitted is printed at a distance by means of a writing machine located in a central transmitting station. The matter thus printed is reproduced at the same time in registering apparatus installed in receiving stations at the houses of the various subscribers. In our figure, the receiving machine is shown at the rear of the transmitting one.

After many hesitations and difficulties, it became possible to install a service which is now operating in the offices of the Havas agency, Place de la Bourse. Mr. Nigron, superintendent of this service, has been kind enough to explain the system to us and show us the mechanism of it. We shall be content in what is to follow to point out the general principle solely. The entire number of our journal would scarcely suffice to give a detailed description of the different apparatus.

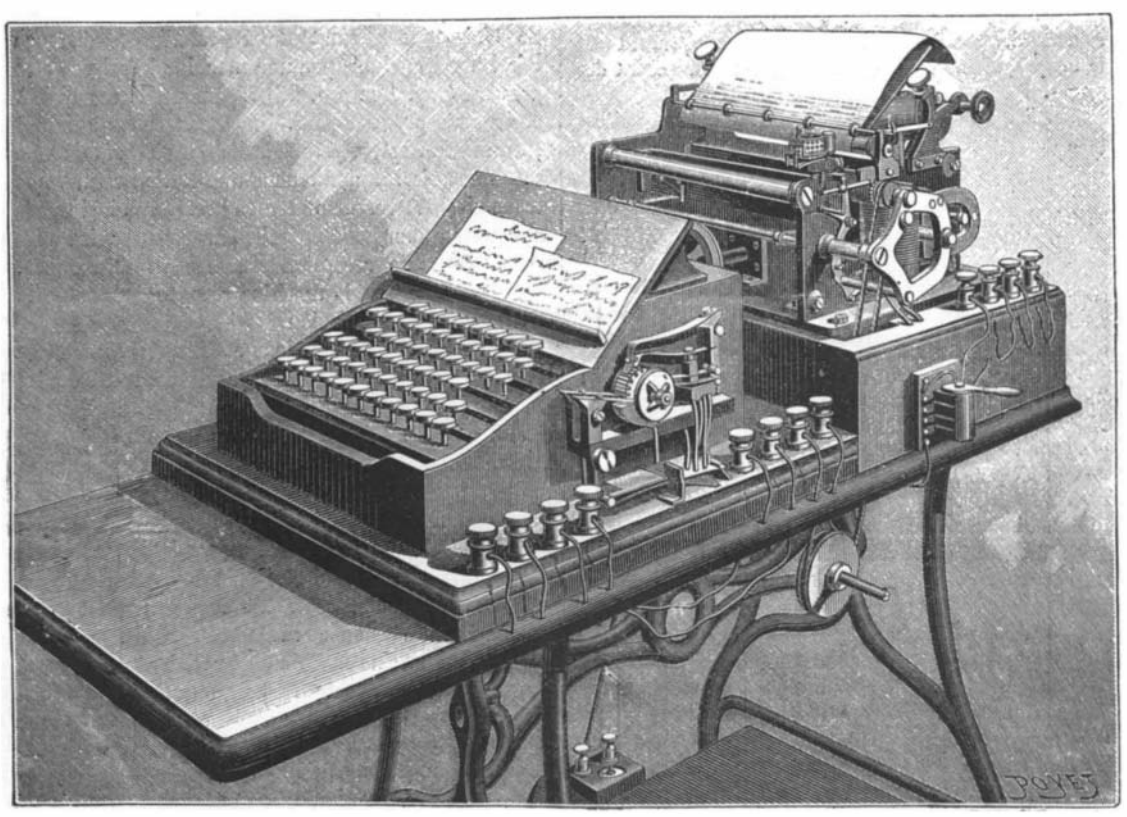
In one of the halls of the Havas agency is installed a central station that constitutes the transmitting post. A writing machine with keys actuates a special commutator that permits of sending currents into a line upon which are arranged various receivers or writing machines. These latter are genuine masterpieces of mechanics, without clockwork movement. A type wheel, upon which the various letters of the alphabet are engraved in relief, obeys the currents that are sent from the transmitting station and prints the transmitted characters upon a roll of paper. There is no longer a question here, as in the old American machines, of a band of paper three-quarters of an inch wide, but rather of a roll five and a half inches in width. It is therefore possible to obtain a sheet constituting a true document. Without dwelling at length upon the interior details, we shall say that the commutator, of which it is a question above, is set in motion by means of a small electric motor, which receives the electric energy necessary for its operation from a battery of sixty Tudor accumulators. The charge of these elements is effected by the aid of a deviation taken from the Edison sector.

The transmission in the exterior circuit of the apparatus is made at a difference of potential of 100 volts and with an intensity of 0·38 ampere. The Havas agency is at present performing two services, the race track and the financial. It is supplying about forty-five subscribers distributed to the number of fifteen per circuit. The number of subscribers per line is not limited, but the derangements of the service can be restricted in case of accident by diminishing this number on each line. The cables necessary for such transmissions are strung in the sewer by the care of the state. These apparatus may be seen in the large hall of the Comptoir d'Escompte at Paris, where they are in regular operation. The roller is seen moving forward at every instant and becoming gradually covered with numerous inscriptions.

The advices thus transmitted are most valuable. In the financial service, all the foreign quotations of the evening are furnished to the subscribers the next morning. The distributions continue thus from instant to instant during the entire day, and especially at the moments of activity at the Exchange. All the dispatches received from every quarter by the Havas agency are immediately sent out as soon as received in the office. The information relative to the service of the races is also very curious. If it is a question of an important affair, the particulars telephoned from the race track to the agency are transmitted at the moment of starting, at the third stretch, half stretch, finish, etc. A race has scarcely terminated before a subscriber has been able to foresee the results of it. The great interest that a service of this kind may present may be readily seen. The price of subscription, moreover, is not high, it being $300 a year for the financial service and $120 for that of the races.

The Havas agency will not stop at the two services of which we have just spoken. It is working at present at the installation of a third service for the supplying of political news. The machine utilized will be more powerful and more rapid than the preceding. All the machines necessary are not yet ready, but we have already been able to see some models of them, one of which we give a general view of in the figure. In the foreground is the transmitter or writing machine that serves to establish the contacts necessary for the electric transmission. Back of this is the receiving apparatus, like those that are installed at the houses of the subscribers. At the top is seen the band of paper that unwinds opposite the type wheel that does the printing.

These present arrangements, imported into France for the service of rapid distribution of information, prove to us that the proverb "Time is money" does not remain English, but is becoming universal.—La Nature.



WRITING MACHINE FOR TRANSMITTING A MESSAGE TO A DISTANCE.

Injury to Boilers by Grease.

It has often been observed that small quantities of grease in combination with deposits lead to boiler accidents. This compound gets deposited on the plates, and the most violent water circulation is sometimes insufficient to remove it. The plates, in consequence, get overheated and accidents arise. The introduction of grease inside the boiler should be avoided, especially where the water from the condenser is used for feeding the boiler, by the use of a sufficiently large feed water filter. The Berlin Boiler Inspection Society had the following case brought under its notice: Two single-flued boilers, 4 feet 8 inches diameter, 23 feet long, flues 28 to 22 inches diameter, pressure 12 atmospheres, were used to generate steam for a 150 horse power engine with surface condenser. The installation had only been in work since July, 1893. A considerable portion of the flue of the left boiler had collapsed. This could not be attributed to shortness of water. On examination it was found that nearly all over the boiler a fatty brown slime had been deposited, which, being placed on a red hot iron, burst into flame. The feed water pump got its water from a large open tank over which a small filter was placed. The condensed water was led to this filter in order to have the grease removed. Unfortunately, the arrangements were so bad that a considerable portion of the grease found its way into the boiler. A similar case was recorded by Mr. Abel at the last meeting of the Markisch Society of Testing and Inspecting Steam Boilers. Four boilers, the feed water of which was heated by the exhaust steam from a Westinghouse engine, after being in use about six weeks, were so damaged that one boiler had to be completely removed; the other three had to receive extensive repairs. An examination of the boilers showed that the flues were covered with a deposit of fatty slime. An analysis of this showed that about 52 per cent of it consisted of mineral oils and paraffine, and 27 per cent of animal fat. It is strongly advised, therefore, that feed water shall always be filtered so as to remove any oils or grease.

The Florida Sponge Industry.

BY WILLIAM B. BURK.

Sponge is a substance with which almost everyone is familiar, as there are but few living in civilized communities who do not find occasion to use it for a great variety of purposes. The article is so very useful that a large number of inconveniences would arise if it could not be obtained. Without it, what would the surgeon, the traveler or the housekeeper do? And yet most of those who use sponges in an infinite variety of ways all their lives never stop to consider how they are formed; that is, whether they are plants or animals, or what their history or habits may have been.

Sponges consist of a framework or skeleton, coated with gelatinous matter and forming a non-irritable mass, which is connected internally with canals of various sizes. The ova are very numerous, and present in appearance the form of irregular-shaped granules derived from the gelatinous matter which grow into ciliated germs, and, falling at maturity into small canals, are then expelled through the orifices. When alive the body is covered by a gelatinous film, which, being provided with cilia, causes a current of water to passin at the smaller pores and out at the larger apertures, the sponge probably assimilating the nutritive principles contained in the water.

Sponges are found abundantly in tropical waters generally. They gradually decrease in numbers toward the colder latitudes till they become entirely extinct. They vary much in shape. Some are shaped like a vase, others are semi-cylindrical, others flat like an open fan, and some are round.

The commerce in sponges is of considerable importance. The great difficulty which is experienced in any attempt to distinguish species results from the extreme susceptibility of all keratose sponges to any change in external conditions. They appear to require for the production of the forms in abundance tropical or subtropical seas, and attain by far their greatest development in the number of the forms and species in the Gulf of Mexico and West Indian seas. The typical forms, the commercial sponges, are essentially confined to the waters of the Bahaman Archipelago and the southern and western coasts of Florida in the western hemisphere and to the Mediterranean and Red Seas in the other.

The Florida sponge grounds form three separate and elongated stretches along the southern and western coasts of the State. The first includes nearly all of the Florida reefs, the second extends from Anclote Keys to Cedar Keys, and the third from just north of Cedar Keys to Saint Mark's. The Florida grounds have a linear extent of about 120 miles, beginning at Key Biscayne, in the northeast, and ending in the south at northwest channel, just west of Key West. The northwestern half of the grounds is very narrow, having an average width of only about five miles, and being limited to the outer side of the reefs. At about the Matacumbo Reefs the grounds broaden out so as to cover the entire width of the reefs, which are much broader here than at the north. The entire southern half of the grounds has more or less of the same breadth, which is about 13 or 14 miles.

The second sponging ground begins just south of Anclote Keys, with a breadth of 7 or 8 miles, which it maintains from a point opposite Bat Fort to Sea Horse Reef, just south of Cedar Keys. The total length of this sponging ground is about 60 geographical miles. Its distance from the shore varies somewhat. At the south the inner edge approaches within 4 or 5 miles of the mainland, and comes close upon Anclote Keys; but throughout the remainder of its extent it is distant 6 to 8 miles from the shore until it touches the shallow bottom and reefs of Cedar Keys. The depth of water on these grounds, as indicated on the coast survey charts, ranges from 3 to 6 fathoms, but many portions are undoubtedly shallower than this. The northern ground, which maintains a nearly uniform width throughout, is about 70 miles long by about 15 miles broad. It approaches to within about 5 miles of the shore and terminates just off the mouth of Saint Mark's River; the depth of the water is the same as upon the next one to the south, i. e., from 3 to 6 fathoms. The total area of the Florida sponging grounds, which are now being worked, including also those that were formerly fished upon, but have since been more or less abandoned, may be roughly stated at about 3,000 square geographical miles. This probably does not include all of the sponging grounds occurring in Florida waters, for the fact that new areas are being constantly discovered would indicate that there might still be more to find, and it is certain that no strenuous efforts have yet been made to extend the grounds already known, the discovery of new ones having generally been made by accident.

The sponge fishery of the Florida coast differs from that of the Mediterranean, in that sponges are not obtained by divers, but by means of a long hook fastened to the end of a long pole and managed from a small boat.

In Florida small vessels of from 5 to 50 tons measurement are employed to visit the grounds to afford quarters for the men and to bring home the catch. These vessels are generally of light draught and schooner rigged, having proportionately large decks on which to carry boats, working gear and the sponges caught. The holds are of considerable size, for storing the sponges, and the cabins generally small, indicating a sacrifice of comfort to working room. Each vessel carries, according to its size, from five to fifteen men, one as cook and the remainder as fishermen, and also a small yawl boat to every two fishermen, to be used by them in securing the sponges. In addition to the working tools for taking sponges, they are provided with a sufficient quantity of provisions, wood and water for the trip, lasting from four to ten weeks.

The working outfit for a Florida sponging vessel consists of a few small yawl boats, called dingies, and a supply of sponge hooks and sponge glasses. The boats used are always made as light as possible. They are from 15 to 20 feet long and from 4 to 6 feet wide. The idea is to have the boats light enough to enable two men to haul them in and out over the side of the vessel, and yet strong enough to withstand the rough handling which they are sometimes subjected to, and to carry the heavy loads resulting from a day's catch. While catching sponges it is necessary to scull the small yawl boats (dingies) from the stern, and, for convenience in doing so, this form of sculling notch is used: A piece of oak plank about 6 inches wide and 1 foot long is notched at one end to fit the oar and inserted at the other between two guiding strips well fastened to the stern sheet. This sculling notch is placed at one side of the center of the stern sheet and is made to be easily removable in order that it may be taken out of the way when not needed. The sponge hooks are made of iron with three curved prongs, measuring about 5 to 6 inches in width. The entire length of a hook is about 8 inches, the upper end being made into a very strong socket for the insertion of the pole.

The sponge glass is made from an ordinary wooden bucket, the wooden bottom being replaced by one of ordinary window glass securely fastened by cement. In using a sponge glass it is placed upright on the surface of the water, the handle of the bucket is placed on the back of the neck of the fisherman with his head thrust down in the bucket. In this way the fisherman can distinctly see very small objects in very deep water, and he can easily distinguish good sponges from those of an inferior grade.

When the sponger discovers a suitable sponge through the aid of the sponge glass, he hurriedly grasps his hook, and, plunging it directly upon the sponge, he skillfully pulls it from its habitation and brings it up to the surface and places it in the boat. As soon as the fisherman collects a sufficient quantity, he takes them to the vessel, where they are spread carefully on the deck in their natural upright position, so as to allow the slimy matter, called "gurry," by the sponger, to run off. During the first stages of decomposition they have a very unpleasant odor, something like decayed fishy matter. After the dingies collect sufficient sponges to make a vessel load, they are taken to what are called sponge crawls, which is an inclosure of about 10 to 12 feet, made generally by placing stakes in the beach where the water is from 2 to 3 feet deep.

Sponges, after being kept on the decks of the vessel from one to two days, will generally be sufficiently cured to be taken to the crawls, and then they are kept there for a few days and then thoroughly washed and pounded with a flat stick. They are then placed upon strings of about 6 feet in length and taken to the markets, where they are sold at auction. They are generally sold in lots, and then carefully trimmed and packed in bales weighing from 15 to 100 pounds each, according to quality, the cheaper grades being generally packed in the larger bales.

The principal varieties of sponges found in Florida are the following: sheep wool, yellow and grass. The Florida sheep wool are the best quality, being of very fine texture, soft and very strong and durable. The yellow sponge is of fine quality, but not strong in texture, and not near as soft or durable as the sheep wool sponges. The grass is very much inferior to the others, not being as strong nor so desirable in shape, and being easily torn.

There are no sponges found in the world to equal the Florida sheep wool for softness and strength, and no better bath sponge can be found than a good solid Florida sheep wool, although they are generally sold for washing carriages, etc. In former years Florida sponges were loaded with lime or sand in order to decrease the price, but of late very few loaded sponges have been placed upon the market.

Sponges in great variety are also found in many places in the West India Islands, also in Cuba. The Cuban sponges are the next best to the Florida. The principal varieties found in Cuba or the West Indies are sheep wool, reef, yellow and grass, also velvet, which are next best to the sheep wool.

The finer grades of sponges are found principally in the Mediterranean, such as the fine surgeon's, toilet, bathing and nursery sponges, and they are very much higher in price than any others.

Florida produces nearly double the amount of sponges that are imported from all other countries, that is, in value, not quantity, and the demand for good Florida sponges is considerably greater than the supply. Consequently, the prices must advance from year to year. The prices have more than doubled, within the last twenty years, for Florida sponges.

The fine, soft species of sponges, such as surgeon's, toilet, nursery, bath, etc., are found in great variety in the Mediterranean, and are fished principally by divers, sometimes at great depth. After being brought to the land they are buried in the sand and allowed to decompose, after which they are well washed and beaten with a small stick, and then packed in bags and sent direct to London, and again thoroughly cleaned and packed in cases according to size and quality. The large London dealers have almost complete control of the sponges found in the Mediterranean. There are a great many varieties found there, principally the fine surgeon's, toilet, bathing, potter's, fine thin flat (called elephant's ears by the native fishermen), fine cups, Zimocca toilet, Zimocca potter's, etc. Some of the finest cup sponges are sold at as high as $100 per dozen. The Mandruka bath sponges are also very expensive and very rare. Some of the cheaper species are also found in the same waters, but none like those found in Florida or Cuban waters.—Amer. Jour. Pharm.

Progress of Irrigation.

The irrigated and irrigable lands of the western part of the United States are mainly included between the one hundredth meridian and the Pacific Ocean, and comprise, according to official surveys, about 610,000,000 acres. Within this great extent of country are nearly all possible combinations of soil and climate. In a general way, however, four great classes may be distinguished. These are desert, pasture, firewood and timber lands. Of these, the desert land is practically valueless, the pasture land is too arid to support vegetation and may be used only as a pasturage, and only the two latter divisions are more or less fertile. The irrigated sections are included in the desert and pasture lands. At present some 3,631,381 acres, or less than six-tenths of one per cent of the entire region, have been provided with an artificial water supply sufficient to raise crops.

The proportion of this desert or pasture land which may in the future be brought under irrigation depends, of course, upon the thoroughness and ingenuity with which the water supply is utilized, but it is probable that it will be under 3 per cent of the entire area. Statistics show, however, that irrigation is a profitable measure and cannot be neglected. The average cost of water for irrigation throughout this section is at the rate of $8.15 per acre. Applying these figures to the total acreage the total first cost of irrigating the lands last year was about $30,000,000 and the total value of the water right was $94,412,000, the increase of valuing being $64,800,000, or 218·84 per cent of the investment. The estimated first cost of the irrigated lands from which crops have been obtained was $77,500,000 in 1889, and their present value, including the improvements, is $296,850,000, showing an increased value of $219,360,000, or 283·08 per cent of the investment in the land. The average value of the crop raised was $14.89 per acre, or a total of $53,057,000. This, it must be considered, exhibits merely the cost and value of irrigation in the arid regions. The value of the unutilized water supply can scarcely be estimated.

During the past four years the federal government has done much to further the work of irrigation by establishing an irrigation survey and by appointing State engineers in California, Colorado and Wyoming, whose duties are practically confined to irrigation.

At present the irrigation of this region is carried on by what is called gravity irrigation.

The different systems adopted by modern engineers may be classified as perennial, periodical and storage work, by irrigation from artesian wells and from subsurface sources. The perennial irrigation includes the supply of water from canals which receive their supply from streams which give a constant supply of water throughout the entire year.

Periodical irrigation includes the canals which have a supply only at certain seasons of the year. A more common plan, however, is the storage system. The dams for this system are generally constructed on intermittent streams for the purposing of receiving and preserving their flood waters.

The irrigation from artesian wells is practiced wholly by means of canals, which convey the water to the land directly from the wells. And the irrigation from ground water sources is performed by tunnels under the beds of streams, which tap some water-bearing stratum or by cuts in sloping ground, by wells to collect the ground water and by similar contrivances.

The work of irrigation calls for much skill and scientific knowledge. Climate, geology and topography must all be considered in the work. It is to be hoped that the skilled engineers now at work on the subject will provide an economical and efficient system for the future.