The Latest About the Edison Battery.

The long delay in the appearance upon the market of the widely heralded Edison storage battery has given many persons an impression that in the development of the invention Mr. Edison ran up against some "snags." What the difficulties met with have been has so far remained dark, but some recent utterances of the inventor and a number of recently issued patents throw some light on this subject.

In the first place, the nominal capacity has been reduced from that given in the first description of the new cell by Dr. Kennelly before the American Institute of Electrical Engineers about two years ago, and with the present rating the Edison battery is hardly equal to the best lead batteries as regards specific capacity. As the amount of energy which a certain quantity of the active material is capable of storing is invariable, it must be inferred that it was found expedient to reduce the proportion of active material to the total weight of the cell. This inference is confirmed by one of the patents referred to, in which it is stated that the oxidizable element of the cell swells considerably during the process of charging, resulting in the bulging out of the walls of the sheet steel pockets which retain the active material. This necessitated a greater space between adjacent plates, which space had to be filled with electrolyte, thus adding to the weight. Possibly the same action necessitated heavier retaining walls. The present invention aims to overcome this difficulty, but it evidently accomplishes the object only in part, for, although it may not be necessary to space the plates as widely with concave pocket walls as with straight walls, the concave walled pockets will hold less active material, which would seem to reduce the capacity.

The subject of the other patent is a new admixture of conducting material for the active material. Originally fine flake graphite was used for this purpose. It is now proposed to mix the finely divided iron with mercury and copper, which is claimed to have the same effect on the conductivity of the active material as the graphite, and in addition keeps up the voltage toward the end of the discharge.—The Horseless Age.

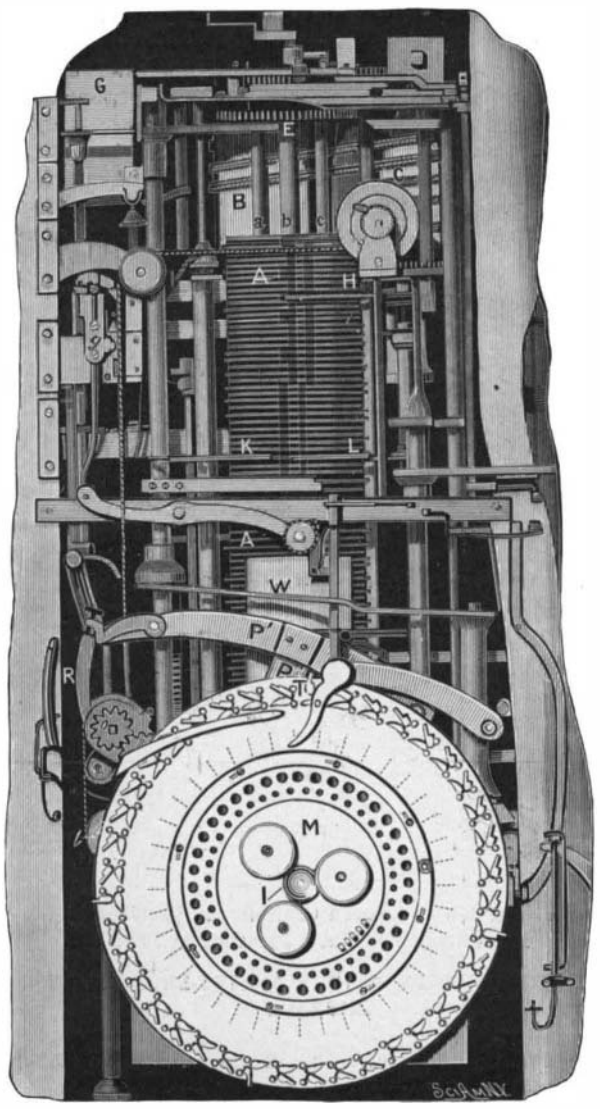
New Statistics of the Weight of the Human Brain.

Prof. Marchand, of Marburg, publishes the statistics of the largest number of brain weights so far collected. His analysis includes 1,169 cases. The average weight of the brain at the birth of a male child, according to Prof. Marchand, is 360 grammes; of that of a female child 353 grammes. He concludes that the lesser weight of a woman's brain is not alone dependent on her smaller stature, for a comparison of both sexes of the same height shows that the male brain is invariably heavier. In a growing child, until it reaches a height of 70 centimeters, the brain weight increases proportionately with the body length, regardless of age or sex. After this the male brain begins to outstrip the female. The maximum weight is attained about the twentieth year, at which age that of the male averages about 1,400 grammes. The female maximum is usually reached about the seventeenth year, when the average is 1,275 grammes.

A new graving dock is to be built at Belfast, Ireland, at a cost of $1,500,000. It will be 750 feet long, 96 feet wide at the entrance, and 100 feet wide at the bottom. The depth will be 32 feet from the blocks to ordinary high-water level, and some 4 feet 6 inches will be allowed for the blocks.

THE JAQUET-DROZ ANDROIDS.

The famous Jaquet-Droz automatons, created in the eighteenth century by a father and son of that name, may have been heard of but probably have never been seen by or described to few, if any, of our readers.



Interior Mechanism of the Writer.

We give, therefore, in this issue, a brief general description of the mechanism of one of the androids, which description we have succeeded in obtaining from their present owner, Mr. Henri Martin, of Dresden, Germany. In the current issue of the SUPPLEMENT will be found a more general description of the androids and of the wonderful feats they performed.

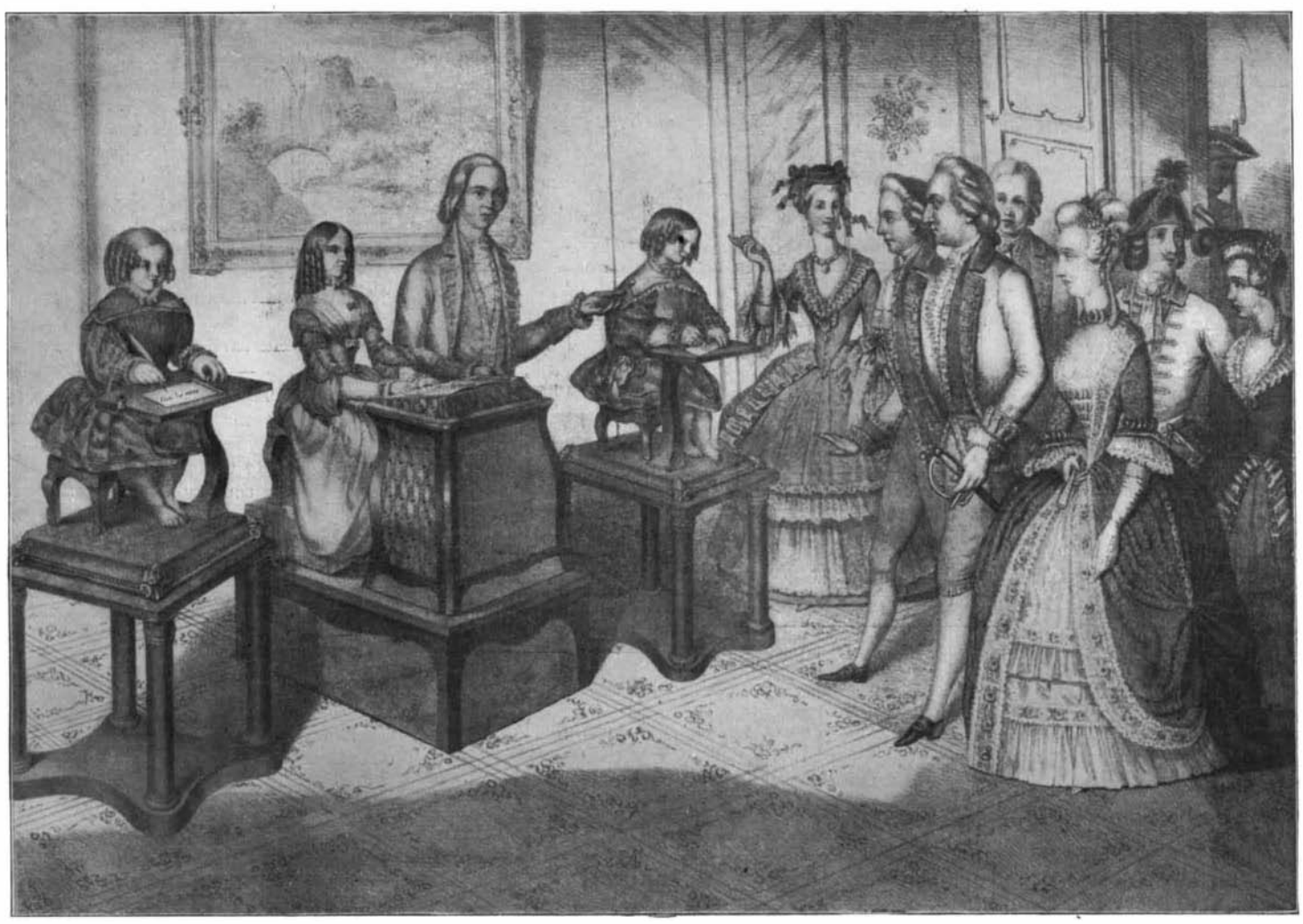
The mechanism, as shown in the cut, is that of the "Writer," built by Jaquet-Droz the elder. The engraving presents a view of the same when the automaton is opened at the back. It is actuated by two movements, an upper one and a lower one. The latter constitutes, as it were, the thinking element, inasmuch as it makes the desired letters and all the necessary preparations, whereupon the upper movement executes the letters proper. Both movements are connected in such a manner that they never operate simultaneously, but that one arrests the other, if it is to act itself.

The barrel, *B*, of the upper movement is connected with the fusee, *C*, by means of a chain, in such a way that, during the winding, the chain unwinds from the former onto the fusee, thus tightening the spring in the drum and causing the movement to start. The motion of the barrel, *B*, is transmitted by means of the gear wheel, *E*, mounted upon the axle, *b*, of the letter cylinder, *A*. At *G*, is the regulator, a fly, which is governed by special stops. From this fly a stop extends downward to the fly of the lower movement in such a manner that when the upper one is free, the lower one is arrested, and *vice versa*.

We will next consider the mechanism of the lower movement. On the arbor, *I*, is mounted the letter disk *M*, consisting of three annular plates connected to each other. Of these plates only the exterior one is visible. The one situated next to this is toothed, while the third one has recesses for the inclined planes. The movement of the disks is simultaneous. The pitch of the inclined planes governs the height to which the driving cam, *P*, is lifted for each letter, and is, therefore, different in each case.

The cam, *P*, is attached to the lever, *P'*. At the end of *P'* is the arm, *R*, to which a double chain is made fast. This chain is led over the pulley, *l*, and around the arbor, *I*, in such a way that it and a similar chain, coming from the other side, cause the loose arbor, *I*, to revolve according as the lever, *P'*, with its cam *P*, is lifted by means of the inclined planes. From this it follows that *I* must make a small or large portion of a whole revolution with each letter. The regulation of these revolutions is accomplished by the teeth, *T*, around the edge of disk, *M*, each pair of which corresponds to a letter or punctuation mark.

Let us now turn to the upper movement. This causes, when the lower one stops, a complete revolution of the wheel, *E*. With this wheel are connected the three rods, *a*, *b*, *c*, so that *b* turns on its axis when *E* revolves. On *b* are mounted 120 eccentric disks, which are maintained in their position by the rods *a* and *c*, in such a manner that the whole eccentric column may be moved up and down on the rods, *a*, *b*, *c*, but at the same time follows the revolution of the rod *b*, on its axis. Each of these disks is specially shaped for a letter corresponding to it. The three levers, *H*, *K*, *L*, bear upon these disks and transmit the motion obtained from them to the right arm and hand. Their motion is a four-fold one: (1) horizontal, moving forward and backward; (2) horizontal, moving right and left; (3) oblique and also arched, resulting from a combination of the first two; and (4) vertical motion. The shapes of the eccentrics have been determined by laborious trials. From the above it will be seen that three disks are necessary to trace one letter. During one revolution the three levers work simultaneously or interruptedly as the eccentrics direct them. The eccentrics are, because of their connection with the crank, through the inclined planes, and because of their perfect adjustment, lifted so accurately in line with the three levers that the latter,



The Writer. The Musician. The Draughtsman.

THE AUTOMATONS OF JAQUET-DROZ EXHIBITED AT THE COURT OF LOUIS XV.—From an old lithograph.

set in jewels, give as a result the desired character.

The writing android can write any sentence, but the proper changes must first be made in the disk *M*, which requires about two hours' work. The actual penning of the sentence of about 40 letters, no matter what text, is accomplished by the android in three or four minutes.

The "Writer" dips the pen in the ink, squirts out the superfluous ink, moves its head and eyes, distinguishes between the down strokes and hair strokes in the letters, and forms them nicely rounded.

The mechanism of the "Draughtsman" is constructed on the same plan, but naturally he draws only certain things. When exhibited before Louis XV., of France, he drew the King's portrait, adorned with a laurel wreath, a gallantry which so impressed the King that he decorated Droz with an order. Shown at the British Court, the "Draughtsman" astonished the royal audience by sketching the portraits of George III., and his wife, Charlotte, on the same piece of paper. He also draws a small dog, under which he writes the words "Mon Toutou," and a picture of Cupid seated in a triumphal carriage drawn by a butterfly. All these objects the little android sketches with the ease of a live person. Now and then, when his drawing has advanced somewhat, he holds the pencil aside, inspects his work at a distance, moving his head and eyes, blows the graphite dust from the paper, and then resumes his work, doing the shading etc., perfectly.

With the "Pianist" we also find the eccentric system. The android, apparently a young girl, twelve or thirteen years of age, is seated at the "Clavinos"—a spinet-like instrument—and plays entirely by the pressure of the fingers, which is essential; hence it is not in itself a music box. It, too, plays only certain pieces. The mechanism in this android also regulates the movements of the body, such as a graceful bow, motion of the head and eyes, heaving of the chest in breathing, etc.

The "Draughtsman" and the "Musician" were constructed by Jaquet-Droz, the younger.

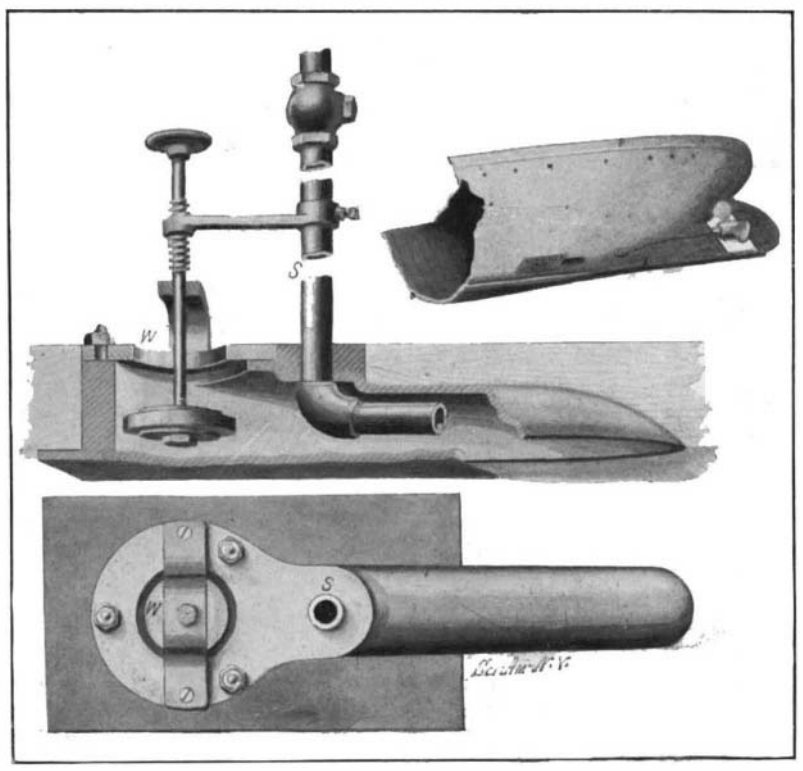
The history of the three androids is an interesting one. Accompanied by an English impresario, Jaquet-Droz, the younger, also showed the androids in Spain. The Spanish King evinced great interest in them, and received the artist with marked attention. But the populace, bigoted and superstitious, did not take kindly to the androids. Jaquet-Droz was thrown in the Inquisition dungeon, and although he was soon set free, his British manager, who had caused all the trouble by representing the matter in a supernatural light, claimed the automatons as his property. Jaquet-Droz returned to Switzerland, thoroughly disgusted. A French nobleman bought the androids, but could not make them work, and for many years they stood in the castle of Mattignon, near Bayonne, because the owner had died on a voyage to America, and no one knew of them. After changing hands various times they came into the possession of the family of the present owner, where they have remained for the last one hundred years. They are in as good condition as they were when created by their makers one hundred and fifty years ago.

Despite the high development of the mechanical arts, these androids have not been equaled up to the present time. They are unique, and art experts have estimated their value at 150,000 marks ($38,000).

APPARATUS FOR DISCHARGING BILGE WATER FROM SHIPS.

The accompanying engravings show a simple apparatus whereby the foul water which collects in the bilge of a ship may be easily and effectually discharged. The apparatus is the invention of Mr. Joseph R. Jobin, care of L. E. Meyer, 302 Chestnut Street, St. Louis, Mo. As illustrated, the water is discharged through a chamber formed by a casing let into the bottom of the hull of the vessel. This casing is provided with a spout or discharge tube projecting rearwardly and lying flush with the face of the hull. The upper wall of the casing is provided with an opening communicating with the hold of the vessel, but is normally closed by a valve *W*. A steam pipe *S* enters the chamber at a point to the rear of this valve. A jet tube is coupled to the end of the steam pipe, and projects into the discharge pipe.

To discharge the bilge water from the vessel, steam is first admitted to the jet tube, and then the valve *W* is opened. The steam in escaping from the jet tube creates a vacuum in the discharge pipe and chamber. This causes the water in the hold to be sucked out into the chamber, and pass out with the steam through the discharge pipe. If it be desired to scuttle the ship, this can be easily done by opening the bilge-water valve without admitting steam to the chamber. Water will then quickly flow into the vessel. The simplicity of the whole apparatus is readily apparent. It requires no attention, since it comprises no moving parts to get out of order. It will be noted that the valve *W* has a very strong construction, whereby it may be firmly seated to prevent leakage.



APPARATUS FOR DISCHARGING BILGE WATER FROM SHIPS.

Nova Geminorum Before Its Discovery.

On March 27, 1903, a cable message was received from Prof. Kreutz, of Kiel, stating that an object which was probably a new star, but was possibly a variable, had been discovered by Prof. Turner. Also, that on March 16 it was of the magnitude 8.0, while on February 16, it had not been seen (presumably on a photograph). Its apparent place was R. A. 6h. 37m. 48s., Dec. + 30 deg. 3 min. The grant from the Carnegie Institution permitted an examination to be made of the early photographs of the Henry Draper Memorial, and furnished the history of this object from its first appearance to the present time. An excellent photograph of the region, taken 1903, March 1d. 15h. 3m., G.M.T., showed stars of the magnitude 11.9, but no trace of the Nova was visible. A similar result was found from sixty-seven plates, the first taken March 3, 1890, the last on February 28, 1903, although nearly all of these plates showed stars fainter than the twelfth magnitude. One or more of these photographs were taken on each intermediate year. It did not therefore seem necessary to examine the other early plates of this region, a hundred or more in number. A plate, taken 1903, March 2d. 13h. 19m., showed stars of the ninth magnitude, but no trace of the Nova. The evenings of March 3, 4, and 5, were cloudy, but on a plate, taken March 6d. 14h. 28m., an object of the magnitude 5.08 appears in the given place. Plates taken on several later nights showed that the magnitude was gradually diminishing.

The photograph of March 6 has especial value since so far as is known, it contains the first photograph of the Nova. The image is on the very edge of the plate, and accordingly was compared with fifteen other stars at about the same distance from the center of the plate. The Nova was compared twice with each star by each observer. The value of the grade was much larger than usual, and equaled 0.21 and 0.33 for the two observers. The mean result for all was magnitude 5.08, with an average deviation, for the separate stars, of ± 0.26.

The evening of March 27 was cloudy and also the early part of March 28. One plate, however, taken on the latter date gave the magnitude, 8.34. Several photographs were taken on March 29, 31, and April 1, and gave the mean magnitudes, 8.24, 8.24, and 8.25. It is probable that the fainter stars are really fainter than these magnitudes indicate, but the latter will serve to determine the relative changes in the Nova as it grows fainter, and thus render the results of different observers comparable. All the magnitudes can later be reduced to an absolute scale. They also serve to compare the faintest stars shown on early plates. Thus, the photograph taken March 1, 1903, shows star t, and also stars at least a tenth of a magnitude fainter. Star u does not appear. Hence this plate shows stars of the magnitude 11.9 and brighter.

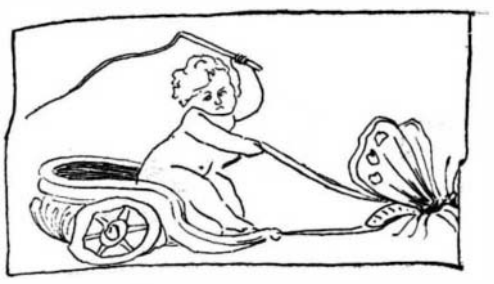
A plate taken March 25 is of interest since it was taken with an objective prism, and accordingly shows the spectra of the Nova and of the adjacent stars. Six bright lines are shown in the spectrum of the Nova, whose designations. assumed wave-lengths, and intensities, calling the intensity of the line $H\gamma$, 10, are as follows: $H\zeta$, 3889. 1; $H\varepsilon$. 3970, 3; $H\delta$, 4102, 8; $H\gamma$, 4341; 10—, 4643, 11; $H\beta$, 4862, 9. From this it appears that the spectrum resembles that of Nova Sagittarii on April 19, 1898. No dark lines are visible, but this is perhaps owing to the small dispersion.

The same lines, and having nearly the same intensities, appeared on similar photographs taken on March 29, 31, and April 1. They also showed the additional nebula line, 5003, which has the intensity 2 or 3, and is certainly brighter than $H\zeta$. This line does not appear on the plate taken March 25, and indicates the first step in the change into a gaseous nebula. Three additional bright lines were detected in the later photographs, whose estimated wave lengths are about 4176, 4240, and 4462.

In the other new stars the appearance of line 5003 was followed by the diminution in intensity of the line $H\beta$, and the appearance and rapid increase in the nebula line, near $H\zeta$, which finally became the strongest line in the spectrum.

A most important question in connection with the appearance of new stars is, whether such objects can come and go without detection by astronomers. Since the Henry Draper Memorial was established, nine new stars have been discovered. Six of them, Nova Persei No. 1, Nova Normae, Nova Carinae No. 2, Nova Centauri, Nova Sagittarii, and Nova Aquilae, were found in the regular examination of the Draper Memorial photographs, and probably all of them would otherwise have escaped detection. Two, Nova Aurigae and Nova Persei No. 2, were bright, and were found visually by Dr. Anderson. The first of these might have escaped detection here, although numerous early charts were obtained which showed that it was visible to the naked eye during seven weeks before its discovery. The spectrum of Turner's Nova is so conspicuous on the plate taken on March 25, that when this plate was developed and examined it would doubtless have been found on it here, but for the prompt discovery and announcement by Prof. Turner.

Edward C. Pickering.
Harvard College Observatory.



Sketch of Cupid Drawn by a Butterfly.

King George III. and Queen Charlotte, as Sketched by the Draughtsman in Their Presence in 1774.

DRAWINGS MADE BY THE JAQUET-DROZ ARTIST ANDROID.

The steady development of the coastwise passenger trade of the United States is shown by the steady growth of the various fleets that run between the leading ports of the country. This is particularly noticeable in the Southern trade and that to the West Indies. During the present month a new American-built passenger steamer the "Monroe" will take her place on the daily service of the Old Dominion Line between New York and Norfolk. She is a steel ship 366 feet in length and 46 feet in beam. She is driven by triple-expansion engines of 4,500 horse power at a speed of 16 knots per hour, and has accommodations for 150 first-class and 76 second-class passengers.

France is no longer the only source for the supply of absinthe. In some sections of Wisconsin the liqueur is distilled not only for American consumption, but also for export to Europe.

The Braun system of wireless telegraphy has been successfully tested in holding communication between stations and moving trains.