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.

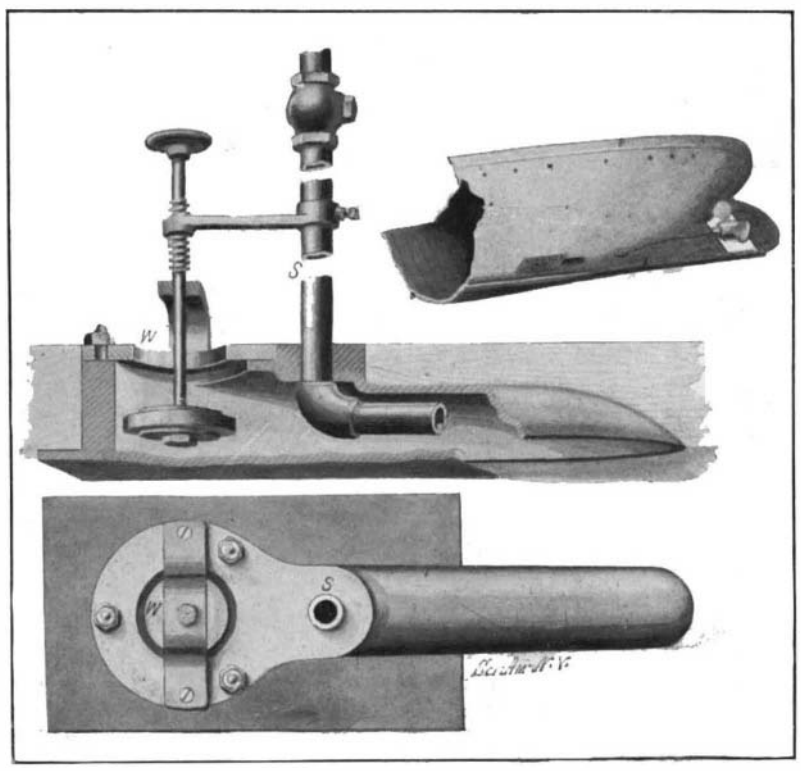
The history of the three androids is an interesting one. Accompanied by an English impresario, Jaquet-Droz, the younger, also showed the androids in Spain. The Spanish King evinced great interest in them, and received the artist with marked attention. But the populace, bigoted and superstitious, did 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.

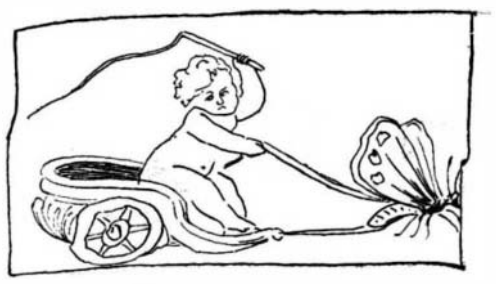
A most important question in connection with the appearance of new stars is, whether such objects can come and go without detection by astronomers. Since the Henry Draper Memorial was established, nine new stars have been discovered. Six of them, Nova Persei No. 1, Nova Normae, Nova Carinae No. 2, Nova 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.

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.



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.

New German High-Speed Trains.

It has been decided to increase the speed of the trains of the Prussian State Railroads running between Hamburg, Hanover, and Berlin. This decision is the outcome of the experiments with the high-speed electric locomotives upon the Berlin-Zossen military railroad. The new high-speed trains are to be propelled by steam, as the Berlin-Zossen experiments proved that heavy electrical trains exercised a great wear and tear upon the rails. All the leading locomotive builders were invited by the State to submit designs and specifications for high-speed steam locomotives. Of the competitive designs submitted, five have been selected, and the firms who prepared these respective projects have again been requested to study further the problem, and to submit fresh designs for steam locomotives capable of attaining a speed of 100 miles per hour with a light load, and 90 miles an hour in ordinary traffic. The five locomotives to be built for the purpose will be submitted to exacting and exhaustive tests to ascertain precisely to what extent they coincide with the State's requirements in the direction of high speed. The construction of these new engines will mark an important development in railroad transit in Germany. Simultaneously the electric firms are endeavoring to overcome the objections, and to eliminate the inherent defects, which characterized the electric locomotives in the Berlin-Zossen tests, so that very keen competition is now rife between the steam and electric locomotive builders, and some interesting comparative data relative to the two systems of train propulsion will soon be available.

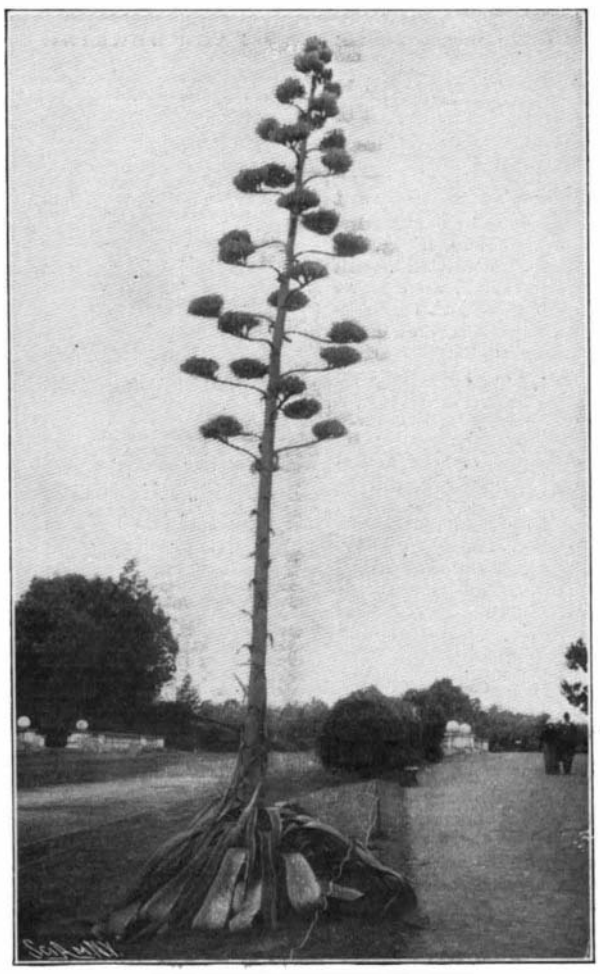
The high-speed steam railway competition, which was inaugurated about a year ago by the German Society of Mechanical Engineers, has resulted in no prizes being awarded; only five of the plans submitted being given honorable mention. It is now under consideration to submit a closed competition between the five more successful engineers under specifications of a more practical nature. In last year's competition it was specified that the steam locomotives were to be designed to be powerful enough, and to be capable, with the cars, of withstanding the high speed of 90 miles per hour, a train speed which has been thoroughly demonstrated both here and abroad to be far beyond the limits of possibility imposed by the track and road-bed conditions of the best railway lines.

It is announced that Stanley Spencer will possibly enter for the St. Louis airship contest.

A CENTURY PLANT IN BLOOM.

BY ARTHUR INKERSLEY.

The "century plant" was so named because of the popular idea that it blooms only once in a hundred years. It need hardly be said that this idea (like most popular ones) is erroneous. In the genial climate of California the plant blooms in from fifteen to twenty years, but in colder climates from forty to fifty years may be necessary to bring it to maturity. The botanical name of the plant is *Agave Americana variegata*, and was given to it because of its splendid appearance. The agave is a native of Northern Mexico, where it is named the maguey, and furnishes pulque, the national drink of Mexico. In Golden Gate Park, San Francisco, the sandy soil is specially favorable to the agave, of which there are about twenty species in various stages of existence. When the plant begins to bloom, it throws up a single stalk, from which the tassel-like flowers sprout forth on either side. The great flower-stalk draws all the sap and vigor from the broad leaves of the plant, which, after it has reached its perfection, droops and dies. But at the base of the fleshy, glossy, dark-green leaves are found little suckers, each with a root, which, when planted, at once begins to grow. Though a century plant in flower is not a very uncommon sight in California, it is sufficiently so to attract considerable attention; while to most Europeans it is a very rare and wonderful occurrence. The accompanying photograph was taken by Charles Weidner, of San Francisco, and was sent by Mr. Arthur Inkersley, of the same city.



A FLOWERING CENTURY PLANT.

The Current Supplement.

In the current SUPPLEMENT, No. 1424, will be found the usual number of articles on widely different scientific and industrial topics. The London correspondent of the SCIENTIFIC AMERICAN concludes his instructive account of the use of motors in agriculture. The description of the Jaquet-Droz automatons, to be found in this issue, is supplemented by a sketch of the two Jaquet-Droz and an account of the wonderful performance of their androids. A method of refining gold by electrolysis and the use of the accumulators of electric vehicles for lighting houses, are electrical subjects that should prove of interest. Mr. Cyril Davenport dwells on the history of finger rings. Mr. Carl Hering discusses the "Latest and Best Value of the Mechanical Equivalent of Heat." The "Evolution of the Pianoforte," is traced by Mr. Randolph I. Geare in an article, very elaborately illustrated by photographs of old instruments. Alfred Russel Wallace's striking theory of man's place in the universe is criticised by E. Walter Maunder. The results of a naval inquiry as to which is the most powerful armorclad afloat are given in an analytical article.

Another competitor for the $100,000 prize offered in the aerial tournament at the World's Fair, St. Louis, has been announced. Bradford McGregor, of Covington, Ky., a designer and mechanical expert, has built a model of an airship which he says will be a success. He claims he will travel through the air from Covington to St. Louis to show that his plan of aerial navigation is correct.

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

ELECTRIC DISPLAY-SIGN.—F. M. SHERIDAN and E. BEHRENDT, New York, N. Y. The inventors have provided in this invention a sign, arranged to display, by the use of electric incandescent lamps, any letter, word, sentence, ornament, or other matter appearing either stationary or movable and to allow the changing of the display in a very simple manner and without disarranging the lamps.

Engineering Improvements.

AIR COMPRESSOR.—B. GASTAL, Pelotas, Brazil. The compressor comprises two cylinders so arranged that the fall and rise of water which occurs alternately in each serves to admit air into the cylinders and then to expel the charge into a pressure tank. The flow of water into and out of the cylinders is effected by float valves.

MOTOR.—C. B. COX, New York, N. Y. The invention relates to a motor adapted to be actuated by vapor produced from a highly volatile liquid such as ether. The generation of the vapor is assisted by hot water surrounding the chamber in which the ether is contained and by hot water pipes passing therethrough.

Mechanical Devices.

CHURN.—F. SWALLOW, Miami, Indian Ter. The mechanism invented by Mr. Swallow relates to an improvement in churns, and its object is to provide one which is dasherless and performs the churning process by imparting a wave-like motion to the cream, whereby this material is rapidly churned and converted into butter with a small expenditure of power.

PUNCHING MACHINE.—W. H. PARKER, Longbranch, N. J. The idea in this invention is to provide a coin-operated machine for testing physical strength, and the result is a new and improved device arranged to correctly show, by means of an indicator, the force of the blow delivered by the operator on the apparatus.

MACHINE FOR FLANGING CAN-BODIES.—H. L. GUENTHER, Chinook, Wash. The improvement provided by this invention relates to can-making machines, and more particularly to a type of special machines employed for forming flanges on the end of cylindrical bodies of cans used for packing foods. Mr. Guenther has succeeded in providing a mechanism reliable and effective in operation and arranged to successively flange the top and bottom ends of cylindrical, oval, square, or other shaped bodies and to automatically remove the completely-flanged can-bodies from the machine.

CLUTCH-MECHANISM.—G. A. ENSIGN, Defiance, Ohio. Mr. Ensign has provided by this invention a clutch mechanism of improved design which is adapted to be readily thrown in gear by the operator whenever desired, and arranged to be automatically thrown out of gear after one revolution is made by the main or driving shaft.

COLOR-PRINTING MACHINE.—G. SCHNEIDER, Berlin, Germany. In perfecting this mechanism the designer provides a machine for printing oil-cloth, wall paper, and like fabrics, arranged to permit convenient and quick insertion or removal of the printing or pattern rollers, minute adjustment of the rollers and the color-supplies, and to give access to the supplies for cleaning, repairing, etc., thus facilitating all work before, during, and after the printing operation.

DERRICK.—C. J. REISE, Mineral, Ill. One object of the present invention is to furnish means to impart traveling motion to the platform in a manner to make it turn a complete revolution in one direction or the other. Another is to simplify the platform-operating mechanism and increase its durability by reducing the number of guide-sheaves and substituting a driving-chain for the cable, the reduced number of sheaves being arranged to utilize the service of the chain.

DRAWING-FRAME.—L. J. WRIGLEY, Lawrence, Mass. Simple means are provided here in lieu of the usual weights, springs, or levers for holding down the rolls in machines for drawing fiber, and there is provision for automatically releasing the pressure should sliver lap around drawing-rolls or other obstructions occur in the fiber. The frame may also be used in connection with railway-heads, slubbers, speeders, spinning-frames, and all machines for drawing textile slivers by means of rolls, providing for the maximum pressure to be exerted by roll pressure from below upward against bearing blocks.

PACKING DEVICE FOR DRILL-RODS OR THE LIKE.—B. SELFRIDGE, Butte, Mont. In obtaining this improvement the piston-rods of rock-drills are provided with more efficient guide and packing devices. The invention is specially applicable to rock-drillers such as the Rand or the Ingersoll-Sargeant machines, in which the pistons, the piston-rod, and the drill-chuck are integral.

BACK-SEAM TRIMMER, C. B. CORWIN, Jefferson City, Mo. The invention provides improvements in a machine which relates more particularly to a trimmer for severing the seam of a backstay. The invention may be used in connection with the shoe-lining trimmer covered by a former patent of Mr. Corwin, and when so used the same framework, gearing and knife may be employed.

Technological Improvements.

PROCESS OF PRODUCING STEEL.—P. EYERMANN, Benrath, near Dusseldorf, Germany. The process for the production of steel consists in heating the liquid pig-iron in a hearth-furnace by the combustion of poor blast-furnace gas, directing an air-blast upon the metal for effecting a preliminary refining, and finally passing blast-furnace gas through the material and burning the same in the furnace.

Miscellaneous.

LACE AND CORD FASTENER.—A. H. SMITH, Tremont, La. The device may be easily and securely attached to a shoe, glove, or other article, and it holds the lace or cord by frictional engagement therewith, and obviates tying or knotting of the lace and allows the easy manipulation thereof in unfastening it. The advantages of this device are many, as it will enable people to make the fastening of the lace more easily, quickly, and securely than any knot, and will exclude all accidental untying or hard knotting.

PHOTOGRAPHIC FILM.—W. H. SMALLEY, No. 213 Selhurst Road, London, England. In making continuous films, the object is to avoid the deterioration of sensitized film by reaction set up between salts contained in the film and the materials with which the film may be in contact. The design in this case is to prevent such chemical action between the film and the protective strip of opaque paper or light-arresting substance with which the sensitized film usually remains in long contact when stored upon the roll-holder.

SAFE.—W. P. MCKENNA, New York. The most distinguishing feature of this invention is the arrangement of the doors, which are mounted on balanced bearings and swing in the arc of a circle to cover or uncover the openings in the exterior wall of the safe. Inside is arranged a drum which is adapted to contain the valuables and which is mounted to rotate around an axis coincident with that of the movement of the safe doors.

SHINGLE-CARRIER.—A. O. BARTLETT, Paullina, Iowa. The object in this case is to provide a device for holding and carrying shingles for the use of carpenters when shingling, so as to hold a bundle in position to be taken one by one by the workman when nailing them on and to hold them in such a way that they cannot be blown off by the wind. Means are provided for raising and lowering the carrier along the roof as the work progresses.

INSECT-EXTERMINATOR.—H. H. BORING, Floral, Ark. To overcome many objections in apparatus employing steam as the destroying agent, Mr. Boring has devised and constructed an insect exterminator, using a water-tank of novel form, having within it a chimney designed to check and to a degree to hold back the products of combustion in its passage up through the tank, and thereby quickly heat and convert the water into steam.

SCHOOL-DESK.—R. G. LITSEY, Haskell, Texas. This invention is an improvement in school-desks, and is in the nature of an appliance by which they may be conveniently removed whenever desired, as when it is needed to clean the room. The cleaning of the room is not only facilitated, but can also be done much more effectively than when the desks are fixed, thus reducing the cost of sweeping and securing better results. Through certain means the device may be adapted to any number of desks in a row.

SHAVING BRUSH AND SOAP HOLDER.—A. Q. WALSH, New York, N. Y. Comprised in this invention is a handle having at one end certain peculiar means for carrying a stick of shaving-soap and a shaving brush. Preferably these means are such as will permit the removal of the brush and soap, and the handle is hollow, so that the brush and soap may be stored therein, thus making the device convenient for travelers.

DESIGN FOR A GAME-CHIP.—S. A. COHEN, New York, N. Y. This ornamental design relates to chips used in games of cards and the like; and it embodies the representation of the profile of a human head, an urn, and scrolls, inclosed in a circular border.

CRYPTOGRAPH.—L. H. WESTON, Holbrook, Ore. In this machine messages or the like may be prepared in cipher for sending, or matter received in cipher may be translated into intelligent language. It provides means by which one or more impressions prepared for transmission or circulation may be taken or secured from the apparatus. Means are provided to prevent unauthorized persons obtaining through the process of frequency or otherwise a knowledge of the key or the matter by mathematical calculations.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.