ceeded in devising a substitute for the covering on moths, which so strongly resembles feathers when seen under the microscope.

In making one of these giants of the insect world, the body, the wings, or the legs may be made first according to convenience, but before beginning operations Mrs. Heidemann executes a working drawing. This is indispensable in order to attain the proportions. In short, the creature is literally mapped out on paper before any part of it is finished. The drawing is always done with the aid of the microscope. After the specimen to be modeled is placed under the lens, the instrument is properly adjusted. Mrs. Heidemann next singles out a portion, and carefully scanning it as it appears enlarged, traces it on the paper. Then selecting another portion, she repeats the process until she has traced what might be termed an anatomical outline. The paper on which the drawing is made is carefully measured and divided into squares of equal size. In this way the exact proportions of the enlargement are more easily obtained.

With the drawing before her eyes, it is necessary only to select the part to be made first and begin the work. The tools of the modeler are few and simple. Pincers, scissors of various sizes, needles, and several knives comprise most of the outfit, but though the equipment is not elaborate, the various processes require so much time that a model may be several weeks in finishing. Mrs. Heidemann does not work continuously on a single specimen, however, but may have several under way in her curious laboratory, finishing a part of one, then of another, as may be most convenient to her. The occupation also produces such a nervous strain, that she is obliged to desist frequently

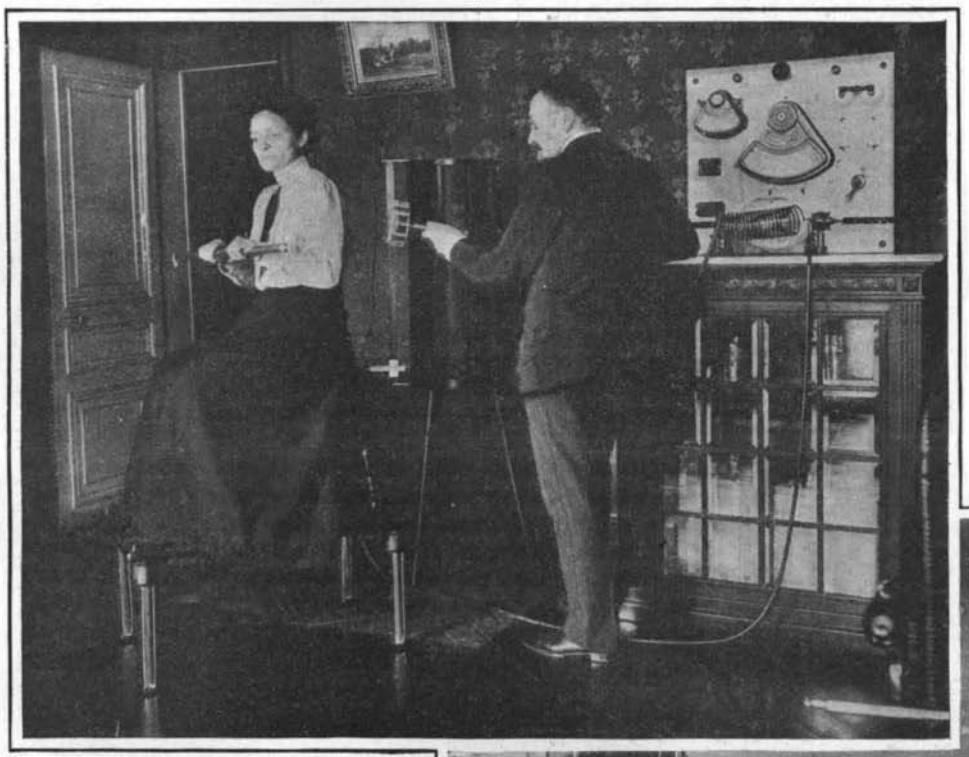


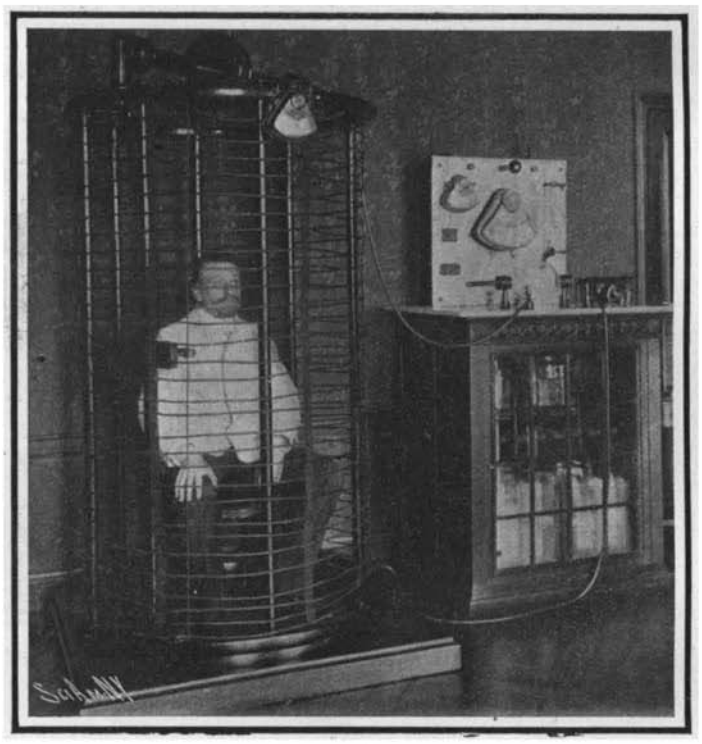
Fig. 3.—APPLICATION OF HIGH-FREQUENCY CURRENTS IN THE FORM OF ELECTRIC SPRAY IN CASES OF EXCESSIVE ARTERIAL PRESSURE.

and rest from it. The Division of Entomology of the Department of Agriculture contains a very interesting collection of these gigantic facsimiles of minute animal life. The collection has been arranged under the supervision of Dr. L. O. Howard, Chief of the Bureau, and is not only interesting but highly instructive as well, especially to all interested in agriculture. It includes the cotton boll weevil, which has inflicted such damage to the staple crop of the South and which the Bureau of Entomology is vigorously striving to eradicate. As seen thus magnified, the weevil slightly resembles an enormous spider with a long snout. This snout is the most closely studied of all parts of the weevil, and with good reason, for the creature uses it in boring into the boll, thus destroying or damaging the contents.

By means of the models the distinction between the various species of mosquitoes can be clearly traced with the eye unaided. The specimens in Dr. Howard's collection include the variety supposed to carry the germs of fever, the comparatively harmless singing mosquito, and the kind which is believed to spread malaria. It would be difficult for even an expert to detect the difference in the actual insect unaided by the microscope, but as already stated, the models make the distinction plain. As a matter of fact, the more harmless of the series might be considered the most dangerous, for it is much uglier in appearance than the others, with its spotted legs and scraggy body. The anopheles, which has such an evil reputation for its bite, is the most harmless in appearance. An idea of the many times which the insects have been magnified can be gained when it is stated that the smallest mosquito is more than twice the length of an ordinary straw hat measured from the ends of its fore legs to the ends of the hind ones. The chinch bug, almost invisible in life, is reproduced in the collection much larger than a pair of cuffs, while its eggs, microscopic in their natural proportions, are as large as shotgun cartridges.

One of the curious results of this magnified modeling is the repulsiveness and ugliness of some of the insects least dangerous to us, and the attractiveness of some of the most harmful ones. Perhaps the most common winged creature which we know is the house fly. It is found everywhere—on the table, sometimes in the food—and it has a most annoying habit of alighting on the person and sometimes preventing sleep. We are so accustomed to it, that we brush it away without further thought. Nervous people might shudder were they to see the specimen in Dr. Howard's collection, for it is one of the ugliest of all. Its legs end in sharp claws that might easily tear one's flesh if the fly were of this size, while the head with its great eyes and what seems to be a protruding jaw adds to its savage appearance. In decided contrast to it is the codling moth, really a beautiful creature with its many-tinted coat of "feathers." This, however, is the bane of the fruit grower, for from it comes the worm that bores into the heart of the apple, and often destroys most of the fruit before it works its way to the surface. One of the most interesting parts of the collection is a huge apple made principally of *papier maché*, showing the worm done in plaster, feeding in its interior. The homeliest specimen in the collection is one of the greatest friends of the horticulturist. This is the variety of beetle known as the lady bug or lady bird. It is probably the greatest enemy to the San José scale which has thus far been discovered. It is needless to refer to the great damage done to peach orchards in various parts of the country until the lady bug was introduced and fed upon the pest. As seen magnified, the beetle looks like a land turtle with its thick rounded shell. It is large enough to hold a cigar in its mouth, which gives a further idea of the enormous size of the reproduction. On the other hand, the body of the scale is quite graceful in form and its wings resemble lace, so delicate are they in appearance, but the long legs and huge eyes of the creature cause it to bear a slight resemblance to a lobster. The ugliest specimen of all, however, is a design of the larva of the lady bug, which looks like a worm from whose skin project sharp spines resembling miniature tree trunks. This was one of the most difficult models to complete, while the plant louse has so few legs and feelers that it is one of the easiest specimens to reproduce. Yet as is well known this living mite is one of the greatest foes of the farmer, since it gets into the green kernels of wheat and other grain, and kills them by absorbing the moisture. It is estimated that the louse has destroyed $10,000,000 worth of cereals in a single season.

While these models have undoubtedly been of great value in giving agriculturists and others, who have visited Washington and seen them, an idea of insect structure and habits, all have had an opportunity to become familiar with the best methods for eradicating those which are pests. But such is the interest manifested in insect study, that there is a constant demand for the models from the managers of State fairs and other rural displays, and they are frequently sent out for the purpose of exhibition. The idea of utilizing illustrations of the models, prepared on the same scale, for instruction, is also finding favor among the agricultural colleges, and there is no doubt that already they have been of much benefit in educating the rural classes in a very important topic to the farmer.



ig. 1.—DR. MOUTIER'S APPARATUS FOR THE REDUCTION OF TERIAL PRESSURE BY MEANS OF HIGH-FREQUENCY CURRENTS.

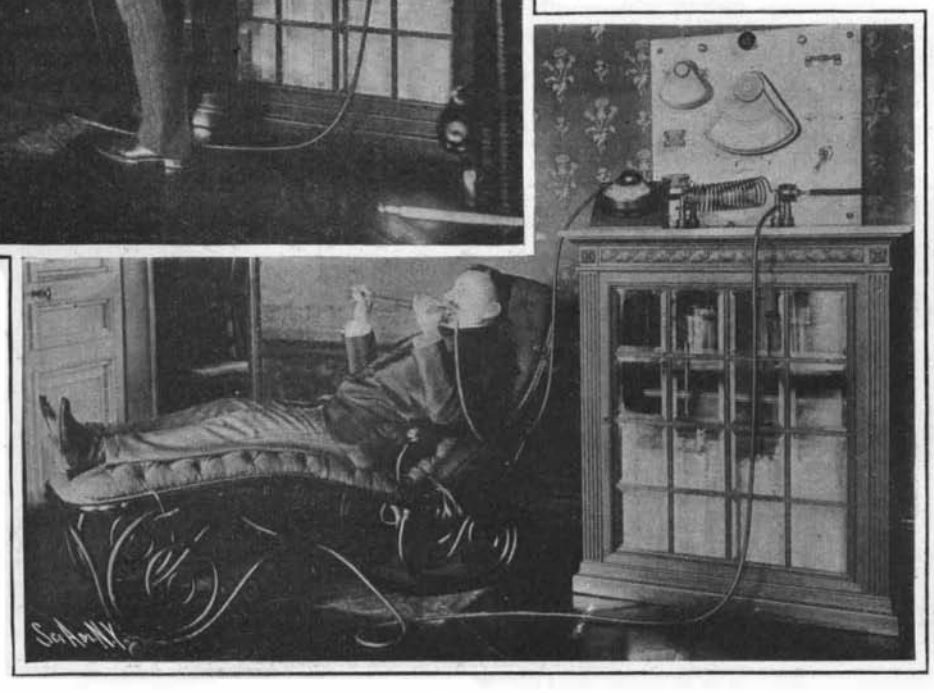


Fig. 2.—CONDENSER BED.

EMPLOYMENT OF HIGH-FREQUENCY CURRENTS IN THERAPEUTICS.

BY JACQUES BOYER.

The arterial blood pressure, which is equivalent to about 6 inches of mercury in health, rises to 10 inches or more in certain diseases and falls to 4 or 5 inches in other diseases—neurasthenia, for example. Excessive arterial pressure is a common symptom of arteriosclerosis, or hardening of the arteries. It is easily detected by the sphygmometer, but until very recently no method of arresting the progress of the disease was known.

Now, however, arteriosclerosis appears to be curable by the method of Dr. Moutier, which is based upon Prof. d'Arsonval's discovery that the blood pressure is instantly reduced by the action of high-frequency currents.

The patient is seated on a chair inside of a spiral coil of wire which is traversed by high-frequency currents. (Fig. 1.) The cabinet shown at the right of the photograph contains a transformer, which gives to the alternating current a tension of 40,000 or 50,000 volts and a frequency of 500,000 or 600,000 alternations per second. This treatment, continued for five minutes, reduced the arterial pressure from 10 to 7 inches. In a second treatment, given to the same patient a few days later, the arterial pressure, which had risen during the interval to 8 inches, was brought down below 7 inches in a few minutes. Repeated applications gradually reduce the arterial pressure to its normal value of 6 inches. In Dr. Moutier's very interesting experiments, the rapidity with which the pressure was lowered appeared to have no relation to the age or gravity of the case, or the degree of hypertension, but to depend chiefly on the state of digestion.

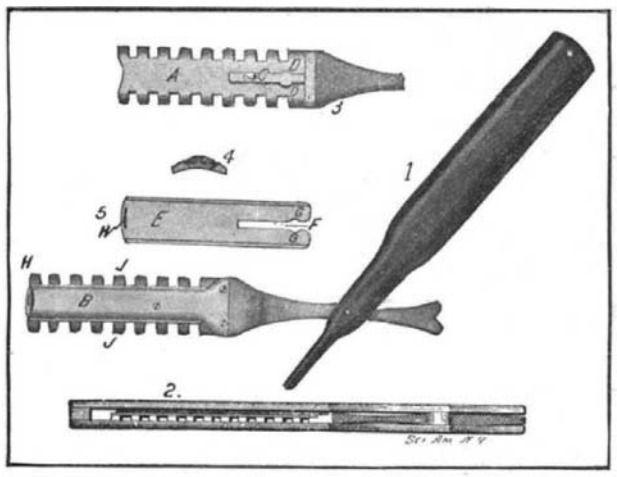
The duration of treatment consequently varies with the condition of the patient, but in general only a few treatments are required. The important feature is that the cure—the reduction of arterial pressure to the normal value—is permanent, and that the progress of the arteriosclerosis is arrested by the removal of the excess of blood pressure. Dr. Moutier has even witnessed the disappearance of functional troubles caused by this hardening of the arterial walls.

By the use of the condenser bed (Fig. 2) Dr. Moutier has succeeded in ameliorating the condition of gouty and rheumatic patients by means of high-frequency currents conveyed directly to the body by the conductor, which is grasped by the hands of the patient.

Finally, the arterial pressure, if abnormally low, can be increased by the action of high-frequency currents applied in the form of the electric spray or effluvium. The patient, seated on an insulating platform (Fig. 3), grasps one electrode, and the other, which is a comb with a number of points, is moved up and down along her spine but at some distance from it. In this way Dr. Moutier has successfully treated a number of cases of neurasthenia.

AN IMPROVEMENT IN SAFETY RAZORS.

In the accompanying engraving we illustrate a razor of the "safety" type which has the form of an ordinary razor and which, furthermore, is provided with removable, double-edged blades. The blades are secured in what may be called the body portion of the razor, and this body portion is formed with a tang which is pivoted in a slotted handle, so that the razor may be folded after the usual manner to protect the cutting edges. The body portion of the razor comprises a guard section, *A*, and a cover plate, *B*, fastened by screws to the guard section. The latter is shown in Fig. 3 with the cover plate removed. Formed

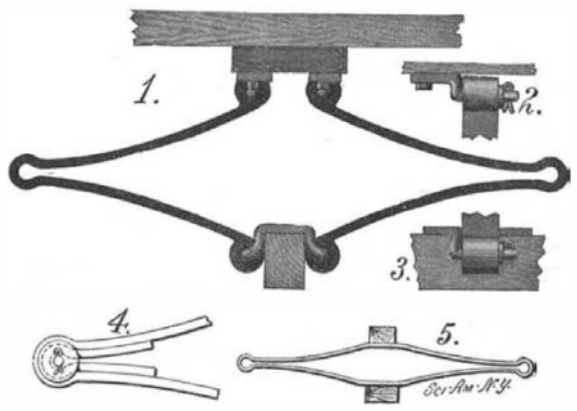


AN IMPROVEMENT IN SAFETY RAZORS.

on the face of section *A* is a tongue or rib, *C*, provided with a pair of opposite lateral projections, *D*. When the cover plate is fastened in place the tongue, *C*, serves to space it from the guard section. In the narrow space or slot so formed the thin razor blade, *E*, is received, as shown in cross section in Fig. 4. The razor blade (see Fig. 5) is slotted at *F* and is formed with notches, *G*, so that when the blade is pressed home between the members *A* and *B*, the slotted ends will spring over the projections, *D*, and interlock therewith. The outer end of the razor blade extends beyond the guard and cover and is formed with finger holds, *H*, whereby it may be grasped and withdrawn from the body portion whenever desired. The razor is formed with opposite cutting edges, which are safeguarded in the usual manner, by means of projections, *J*, on opposite edges of the guard section, *A*. Each razor is equipped with a magazine of blades, so that when a blade becomes dull it may be removed and a fresh blade immediately inserted. A patent on this improved safety razor has just been secured by Mr. J. F. Bailey, Owens Ferry, Ga.

A NOVEL VEHICLE SPRING.

A patent has recently been secured on a new form of spring which, while elastic under a light load, is equally efficient under a heavy load, owing to its self-reinforcing characteristics. When the spring is forced down into the bolster one member will support the other, so that the spring will not have a tendency to break. As shown in the accompanying illustration, the spring consists of two sections of identical form. The sections are made of bar steel, bent to form an upper and a lower member, connected at their outer ends by an open loop. The inner ends of these members are provided with eyes, whereby they may be applied to the vehicle. Both the upper and lower members are curved inwardly, this curvature being on the arc of a 70-inch circle. The method of attaching the sections to the sill of the vehicle is illustrated in Fig. 2. A bracket secured to the sill is provided with a projecting end, which passes through the eye of the upper member, and is made fast by means of a cotter pin. The lower members are secured to the bolster by means of a pair of U-shaped clips, which saddle the bolster. One of the clips is provided with extensions, which pass through the eyes of the spring sections, and the eyes formed on the other clip end are secured by means of cotter pins. This provides a simple means of applying the spring sections to the vehicle. Owing to the curvature of the spring sections, when a heavy weight is carried by the vehicle the upper and lower members of the spring will be forced into contact with each other, and there-

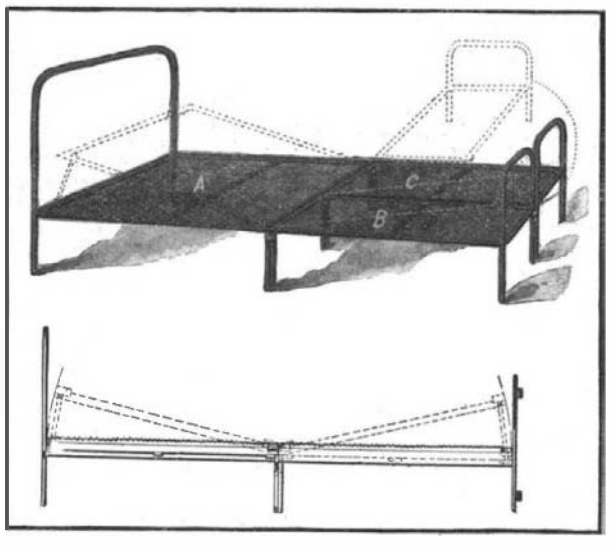


A NOVEL VEHICLE SPRING.

by tend to reinforce each other. A modification of this spring is shown in Fig. 5. It will be observed that the spring consists of a single continuous band of metal in place of two separate sections. A means for strengthening the spring is shown in Fig. 4. It consists of an inner auxiliary spring section, having a terminal eye with two leaves extending therefrom. This auxiliary spring is inserted in the loops of the main spring, and secured therein between a pair of washers by means of a bolt and cotter pin. In practice the leaves of the auxiliary spring serve to support the main spring at its weakest point. The inventor of this novel vehicle spring is Mr. Herman A. Grafe, of Newburg, Oregon.

AN IMPROVED INVALID'S BED.

A number of important improvements are embodied in the invalid's bed which we illustrate herewith. The bed is made in sections, which may be separated and adjusted relatively to each other, so as to enable the physician or nurse to gain convenient access to the patient without materially discommoding the latter. The sections are so arranged that one or both lower limbs or the trunk of the patient may be elevated, as desired. In the illustration the main section is indicated at *A*, and the two foot sections at *B* and *C*. Each section consists of a frame supporting an individual bed-spring section. As shown in one of the figures, each bed-spring section at its outer end is provided with arms pivotally attached thereto, so that when the spring section is raised, the arms thereon will rest on the slats of the bedstead and hold the spring section in place. The arms may be formed with notches adapted to engage the slats, and whereby the sections may be adjusted to any desired angle. The foot sections of the bed are secured to the main

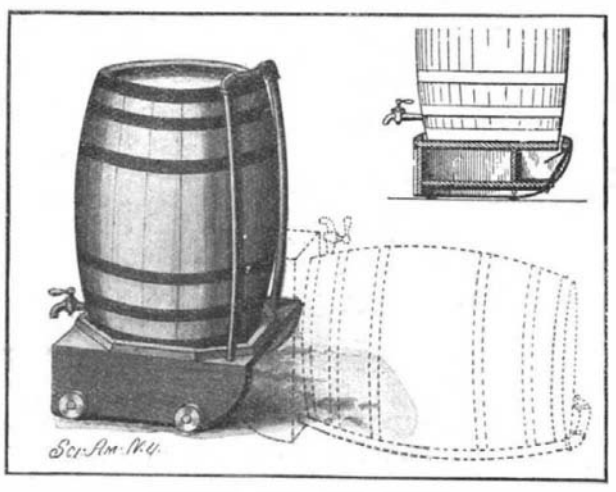


IMPROVED INVALID'S BED.

section by means of hinges, so that they may be swung laterally apart, if desired. The sections are locked together by means of a U-shaped bolt, which passes through eyes formed at their adjacent outer ends. When the bed is thus locked together, it may be used as an ordinary bed. It will be observed that the construction is very simple, and that the bed is adapted for home use, as well as for use in a hospital. A patent on this improved bed has been granted to Mr. Charles O. Lewis, of Fayette, Mo.

BARREL STAND AND TRUCK.

Pictured in the accompanying engraving is an improved barrel stand and truck, intended to facilitate the handling of barrels while inserting a faucet therein, and to assist in placing the barrel in position and in removing the same from place to place. When lifting the barrel to an upright position after the faucet has been applied, there will be no danger of injuring or breaking off the faucet. The stand also provides means for collecting the drippings from the barrel and storing them in a reservoir. One of our illustrations shows a cross section of the stand, showing its box-shaped form. The stand is supported on four truck wheels. The rear end of the stand is curved to provide a rocking surface, on which the stand may be rocked or tipped downward to the position shown by dotted lines in one of the illustrations. At the rear of the stand are a pair of adjustable handle bars, comprising a pair of side bars and an upper cross bar. The side bars are preferably tubular, and are adapted to receive the downwardly-turned ends of the cross bar. A pair of set screws threaded into the side bars are adapted to engage the ends of the cross bar, and firmly secure the latter at the desired adjustment. The upper face of the stand is provided with an octagonal depression formed by nailing molding to the stand. The depression is covered with zinc plate. In this depression the barrel is seated, and any drippings therefrom will collect and flow through an aperture therein into a reservoir below. This reservoir is a vessel supported on a shelf in the stand, and may be readily removed when desired to empty its contents. In use the stand is tipped over to the position shown by dotted lines, and the barrel is then rolled on to the handles. When in this position the faucet is applied, and then the barrel and stand may be lifted to upright position.



BARREL STAND AND TRUCK.

A patent on this barrel stand and truck has been secured by Mr. Peter T. Herreid, of Blair, Wis.

The Source of Radium.

Doubts have been cast on the generally accepted theory that radium is a decomposition product of uranium, says Nature. A recent investigator showed that, starting with a solution of uranium nitrate carefully purified by repeated crystallization, the amount of radium formed in eighteen months was less than 1-2,000 of the amount which the disintegration theory called for. In a recent experiment upon the growth of radium from actinium, this same scientist decomposed a kilogramme (2.2046 pounds) of carnotite ore, containing about 20 per cent of uranium, in an excess of hydrochloric acid. This solution was then so treated as to separate the actinium from the other constituents. It was secured in the form of a chloride, which was then sealed in a glass tube. After two months the gases from the tubes were placed in an electroscope and the activity of the emanation determined. The tube was then resealed and allowed to remain for several months longer. The emanation at the end of this time was found to indicate an activity corresponding to three times the former amount of radium. From this rate of increase it is computed that the half period for the evolution of the emanation would be about 3,100 years. Since the amount of actinium in a mineral is apparently always proportional to the amounts of uranium and radium present, it is thought that actinium may prove to be the looked-for intermediate product.

First American Turbine Liner.

America's first large turbine steamship, the "Creole," was placed in commission July 9. She was built at the Fore River yards, Quincy, Mass., and is one of the three vessels of the same size and type recently added to the Southern Pacific's Atlantic fleet, except that the "Creole" is propelled by turbines. The "Creole" is 440 feet long, 57 feet beam, displaces 10,600 tons, and has a speed of 18.5 miles per hour carrying 4,500 tons. In addition to the cargo, she has 152 staterooms and accommodations for 250 steerage passengers.