wherefore the "horse" rose up on its toes, and the toes began to elongate. The first effect of this was to lift the shorter toes, Nos. I and V, clear of the ground, and being no longer useful in supporting weight, they speedily dwindled and vanished. Meanwhile the middle digit had to bear more and more weight, and hence it grew larger. The process of getting up on tip-toes being continued, Nos. II and IV followed Nos. I and V, until finally only No. III, the middle toe, remained, with vestiges of I and V.

A Fireproof Theater of Armored Concrete.

A well-known German firm is building a miniature fireproof theater of armored concrete, which is specially intended for fire tests, and is to become a model theater where any safety devices which have so far been suggested against the danger of fire, as well as any preventions that might be proposed in future, will be demonstrated.

The theater is to be fitted with a stage of 7.5 meters breadth and 6 meters depth, separated by an iron curtain from an amphitheater 5.5 meters in breadth and 7 meters in depth. The stage consists of the resting place, the rolling floor, a working gallery to the right and another to the left, and an adjusting bridge. The latter parts are of iron, and are suspended by ties of the same material from the ceiling, which consists of massive Monier concrete. The amphitheater consists of a simple gallery with lateral issuing staircases leading into the open. Special rain attachments are to be provided.

In connection with the experiments contemplated, the outlets through which smoke of a fire may escape will be studied with especial care. Any combustible decorations exposed will be fitted as in actual operation. It is thought possible by these experiments to find out devices for rendering a stage fire ineffective to the amphitheater. If the gases are led away promptly and safely from the stage into the open air, and if sprinkling proves an efficient fire-extinguishing agent, an amphitheater of fireproof construction might be safe against any danger of fire. According to a report in Der Gesundheits-Ingenieur, it is intended to make fire tests before filled amphitheaters.

Accident to the Montgomery Aeroplane.

On July 18, in the presence of 2,000 persons who had gathered at the Santa Clara College grounds to see the flight of Prof. John J. Montgomery's aeroplane, the "Santa Clara," the machine collapsed when at the height of nearly half a mile and Aeronaut Daniel Maloney was hurled to the ground. The flying machine was shivered into fragments, and Maloney, who was picked up with a fractured skull, lived only an hour.

A balloon raised the aeroplane to a considerable height. When the fabric was but a speck in the sky, balloon and aeroplane slowly parted company. To the left the aeroplane slowly circled, cutting pretty figures. Maloney seemed to have perfect control of the machine.

Then, suddenly, the device refused to obey the guiding hand of the aeronaut, and with an abrupt circle it plunged quickly to the left and nearly overturned. Maloney could be seen struggling with the guide wires, but it was apparent that his efforts were futile. The machine fell swiftly earthward. One of the wings collapsed as the aeroplane gained added impetus and the mate snapped from its support and fluttered limp in the air. The front wings still remained outspread and checked to a slight degree the swiftness of the descent, but down with fatal impetus the aeroplane came through 2,000 feet of space.

The disaster was probably due to the guy rope catching one of the wings of the aeroplane as it was liberated. The machine has been fully described in these columns.

The Current Supplement.

The current Supplement, No. 1543, opens with a most thorough article on motor omnibuses in London, by the English correspondent of the Scientific American. The article excellently shows how automobile omnibuses are competing with English tramways and gives valuable data. The Cerebotani facsimile telegraph is described by Emile Guarini. Mr. Brysson Cunningham presents a most instructive article on concrete, giving much practical information. "An Island Prison on the Forth," is the title of an article which describes the picturesque Bass. The English correspondent of the Scientific American writes on a torsionmeter for recording the horse-power of steam turbines. Dr. Alfred Gradenwitz contributes a brief but interesting article on the use of bronze castings for naval purposes. Many years ago Prof. Henry Draper prepared a monograph on the construction of a silver glass telescope 15½ inches in diameter in aperture and its use in celestial photography. That monograph to this day is by far the best treatise of its kind ever written on the construction of a reflecting telescope. The Editor of the Supplement has deemed it advisable to republish this valuable monograph and accordingly the first installment will be found in the current issue.

A NEW INTERRUPTER.

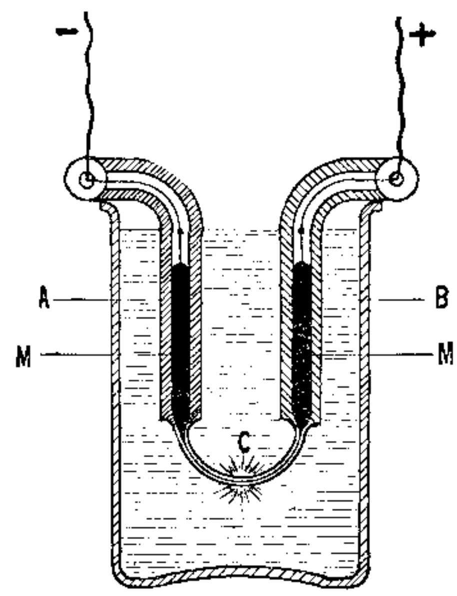
BY HUCK GERNSBACK.

Experimenting with different magnetic and electric interrupters, the idea occurred to me that it might be possible to construct an interrupter whose chief functions would be based upon the expansion and contraction of mercury, when heated, by passing a current through it.

After many fruitless experiments I succeeded in making such an interrupter, and the definite form that proved most satisfactory is explained in the following lines:

A barometric glass tube of about 15 centimeters length, with a central opening of 3 millimeters, is heated in an oxy-hydrogen flame and drawn into the shape, as shown in the accompanying drawing. This is by no means easy, as the tube, *C*, which represents the main part of the interrupter, must be so attenuated as to leave a capillary bore within, its minute diameter not surpassing ⅛ of a millimeter.

Heat the middle part of the tube over the flame by constantly rolling the ends between three fingers of each hand, till it is red hot and soft. Take the tube quickly out of the flame, and draw it straight out, till it is thin enough; then bend it into the right shape, and let it cool slowly. Of course, these manipulations have to be done quickly, because the glass will not remain soft very long in the open air, and it is nearly impossible to draw the capillary tube when the flame touches it. The tube has to be filled then with chemically-pure mercury, which is easily done by placing the end of the open column, *A*, in a receptacle containing the quicksilver. By drawing the air out of *B*, the mercury will quickly mount in *A*, then pass through *C*, and rise up in *B*. It is well to only half fill both columns. The apparatus will generally work



A NEW INTERRUPTER.

satisfactorily, when the whole arrangement can be placed in any desired position without the mercury flowing out of it. This is a sign that the capillary tube, *C*, is sufficiently attenuated.

Two thin platinum wires are introduced into *A* and *B* till they dip in the mercury. The apparatus is put into a vessel containing water, which serves to constantly cool *C*, which part would soon break in the open air. Connect the two wires with two small storage batteries, and the interrupter will start instantly. In the middle of *C* there will be a bright bluish-green spark, and a high-pitched tone will emanate from the interrupter, indicating that the interruptions are of high frequency.

I found that this interrupter works most satisfactorily with 4 to 6 volts; it will consume, when made according to directions, from ¼ to ½ ampere, and run as long as desired. By making the part, *C*, of a larger cross-section, the voltage may be higher and more current will be absorbed, but the interruptions will be very unsteady and irregular, and will very often give out entirely.

The instrument, I believe, cannot be used with high tension currents, as it is too delicate, but it will work satisfactorily in connection with small induction coils, for instance, although a condenser will be required.

The explanation as to how this interrupter works is as follows:

The instant the current is closed, the mercury at the smallest cross-section in *C* will become so heated that it commences to boil, and the force of the resulting bubbles, falling against each other, will be sufficient to make a momentary rupture in the thin mercury column. There will be a little shock, and the expanding quicksilver will rise in *A* and *B*. Of course, a vacuum will be created at the place where the rupture occurred; and as the tube is immersed in water, the mercury will stop boiling; it cools instantly, then contracts, and the atmospheric pressure, combined with the weight of the quicksilver columns in *A* and *B*, will help to bring the metal in contact again, after which the same play commences as described.

The Charcot Expedition.

An interesting lecture on Antarctic exploration was recently delivered before the British Royal Geographical Society by Dr. Jean Charcot. This explorer has only recently returned from an expedition which was organized and primarily financed by himself, and the lecturer related the results of his researches. Dr. Charcot limited his expedition to the survey of the northwest coast of the Palmer Archipelago (Hoseason, Liege, Brabant, and the Antwerp Islands); the exploration of the southwest entrance to the Gerlache Strait and of Graham Land, with a view to elucidating the Bismarck Strait, and to follow the coast as far as Alexander I. Land, so as to substantiate and further the labors of the Gerlache and Nordenskjold expeditions.

His vessel, the "Français," was of only 245 tons. The staff consisted of six unpaid officers and a crew of fourteen, all French except one Italian, an Alpine guide. Dr. Charcot himself was captain, doctor, and in charge of the bacteriological studies. The expedition left Buenos Ayres on December 23, 1903, reached Smith Island (South Shetlands) on February 1, 1904, and thence went on to Low Island. Coasting the northwest side of the Palmer Archipelago, they entered Briscoe Bay, and afterward stayed eleven days in Flanders Bay. Then, after erecting a cairn on Winche Island (this cairn was missed by the Argentine relief expedition, which therefore believed and reported that the "Français" and her crew were lost), they sailed on and reached Pitt Island on February 26, but were compelled by ice to return to Wandel Island, where they wintered. The ship was protected from ice brought in by the northeast gales, with cables across the mouth of the narrow haven. They erected a portable house, excavated storehouses, and set up shelters and instruments for magnetic observation, observation with quadrant and sextant, and so forth. The temperature varied much and suddenly; the lowest was —30.4 deg. F., but a rise from —22 deg. F. to 26.6 deg. F. in a few hours was not uncommon, and was always followed by violent gales from the northeast, which broke up the ice between Wandel and Hovgaard islands, and so prevented any move being made, in spite of many efforts. In December a channel was made by means of melinite and saws and picks, and the "Français" returned to Winche Island. Early in January they came in sight of the Briscoe Islands, and on January 11 saw Alexander I. Land rising very high on the southeast. The voyage was continued in great difficulty and danger in the hope of finding means to reach the land, on which several peaks hitherto unknown had already been descried. On January 14 the "Français" struck a submerged rock, and received damage which necessitated pumping incessantly all day and night, and this was maintained for weeks until the ship so far recovered as to be safe with only fifteen hours' pumping, in which condition she ultimately returned to Buenos Ayres. The new coast along which she was sailing was surveyed, drawn, and named after President Loubet, and the "Français" turned north again past the Briscoe Islands, the expedition completing its survey as it went, and finally reached Puerto Madryn on March 4.

Another Device for Preventing Seasickness.

An ingenious self-leveling sea bunk for vessels, the object of which is to overcome the discomfort to the passenger of *mal-de-mer*, has been devised by a London dentist. It has now been in successful operation upon one of the mail-boats plying across the English Channel. The device comprises a swinging cot with four cords passing from the corners to electric brakes, which automatically check any attempt of the cot to depart from its position. While the cot remains level, the cords are free to pass on and off the pulleys on the brakes. The slightest loss of horizontality of the cot causes mercury in four tubes to fall in some of them and rise in others, and so complete the electric current to the particular brake required to be put in operation to check the further loss of horizontality. The loss of level from the variation of the position taken by the passenger is automatically compensated; water being practically the same specific gravity as the human body, a heavy man will press more water to the foot of a specially-designed water bed than a light weight, as also from side to side.

The Dangers of Cheap Leather.

The danger attending the use and wearing of adulterated leather is not perhaps fully realized. A large amount of the cheap leather is weighted with glucose and barium, especially the latter, so that when the weight test is applied, such adulterated leather may pass as first-quality material. Leather so treated, however, has the peculiar quality of absorbing moisture freely and retaining it to an extreme degree. The result is that a boot made of this chemically-treated material is in actuality never dry. Even in the driest weather the perspiration of the feet is sufficient to render the footwear dangerous, as such natural moisture acts upon the inner sole and collects there.