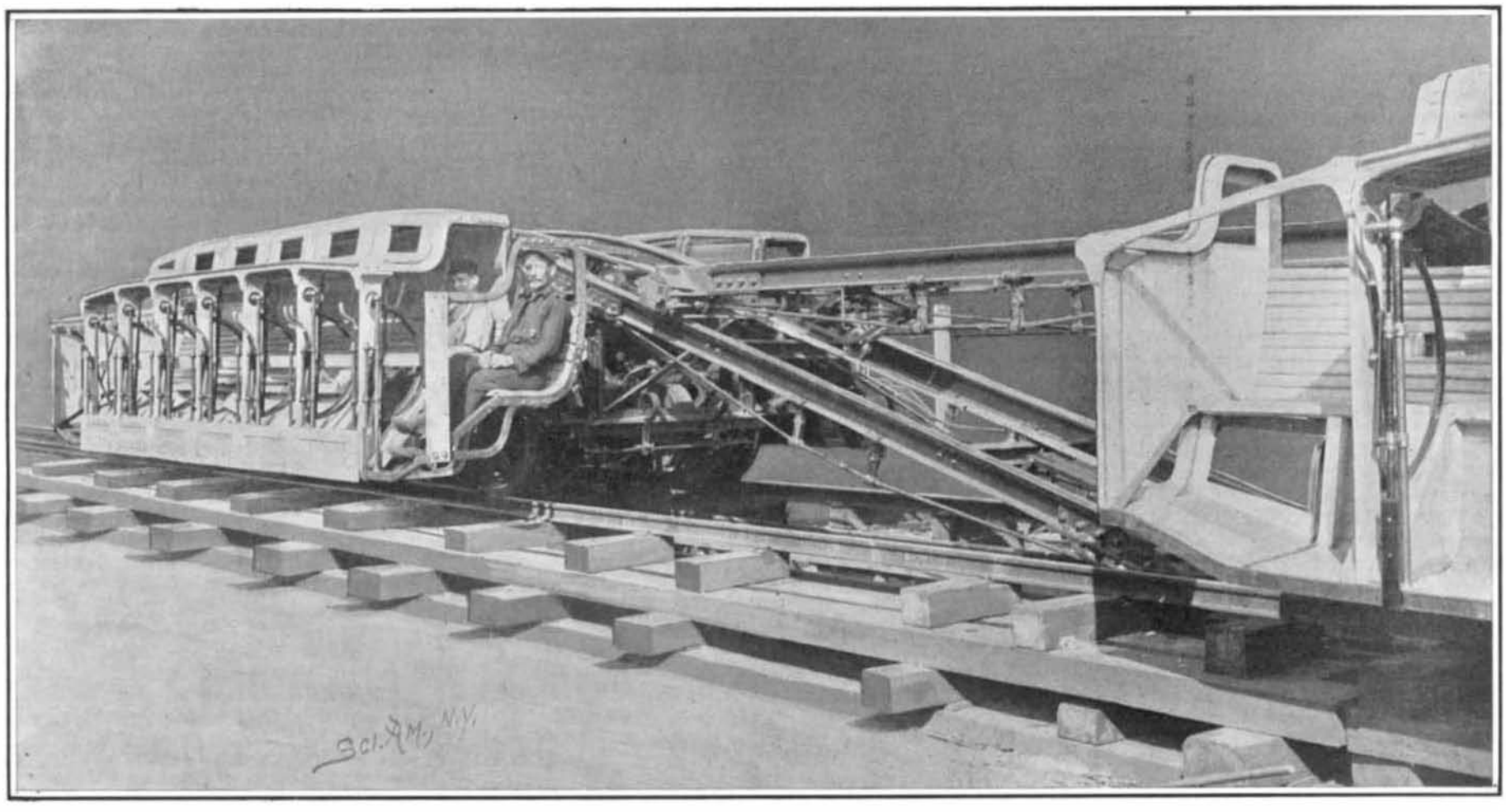
a rampart with their great shields. They have battle-axes as well as spears, and two bronze ax-heads of similar form were also found by M. Sarzec, together with the long spear-head which is shown in one of the engravings. This spear-head is also of bronze, and is over two feet long. One feature to be noticed is that all the warriors as well as the king maneuver their spears by holding them almost by the end and pushing them toward the front. The king, who holds spear strikes him in the forehead between the eyes.

In another place a cow is shown lying on its back and attached to two stakes as if for sacrifice. The four different scenes of the Vulture stele form four distinct bands of figures, and there were no doubt other bands which are now missing. The first rank, therefore, shows Eannadou with his heavily-armed infantry gaining the victory over the enemy. In the second band, the king is seen on his chariot at the head of

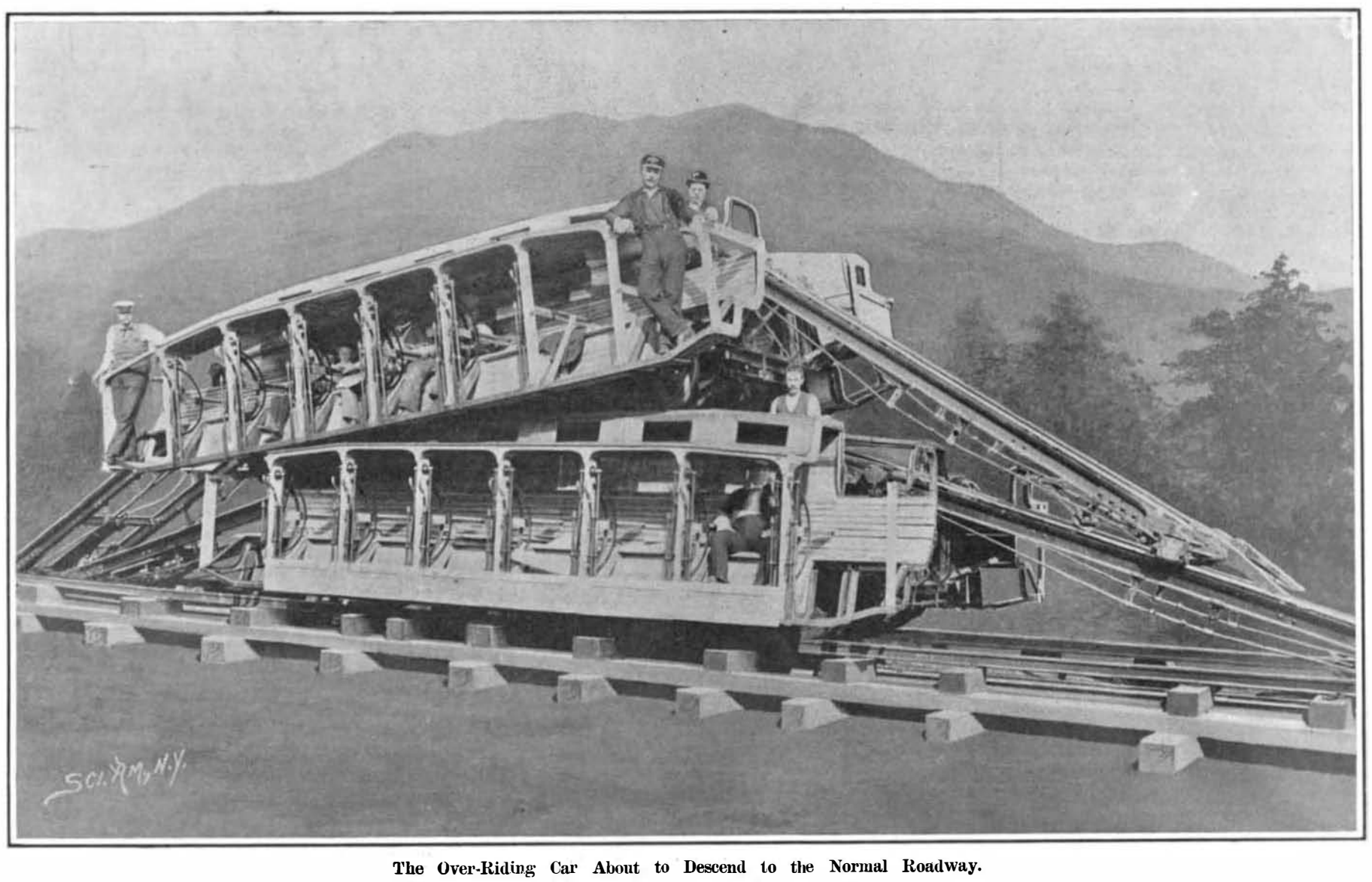
The other side of the stele is of equal interest. It presents a different class of figures from the front. One of the fragments shows two curious heads of war-goddesses with a two-horned head-dress crowned with feathers.

THE "LEAP-FROG" RAILWAY.

Something new has been added to the list of attractions at Coney Island. To the regular visitor of the



The Pilot Guiding the Superimposed Car up the Incline.



The Over-Riding Car About to Descend to the Normal Roadway.

THE "LEAP-FROG" RAILWAY.

a weapon in either hand, may be ambidextrous, like Homer's hero. One of the fragments shows the king, who is brandishing his spear and directing it toward a group of the vanquished enemy with shaven heads, whose chief turns back and holds out his left hand as if to implore mercy. But the point of the

the light troops and is pursuing the flying enemy. In the third range he celebrates his victory by a sacrifice which is associated with a funeral scene. Fourth, he immolates the prisoners and he himself immolates a vanquished chief. This is no doubt the oldest battle scene which we possess.

city's great playground, this statement in itself is remarkable. Each year, with the approach of summer, the appearance of new and much-heralded wonders leads us to think that human ingenuity in designing the startling amusement devices that stir the jaded emotions of the great East Side has about reach-

ed its limit. It is with astonishment mingled with admiration that we see the modern showman branch out successfully into the various departments of science and engineering, seeking for novelties. The day of cheap, catch-penny shows is rapidly passing; and as the quality of the entertainments becomes better, so does the taste of the general public attain a higher plane, and consequently, we find among the amusement devices, mechanical appliances and constructions that display great engineering skill and intelligence and thorough knowledge of physical laws.

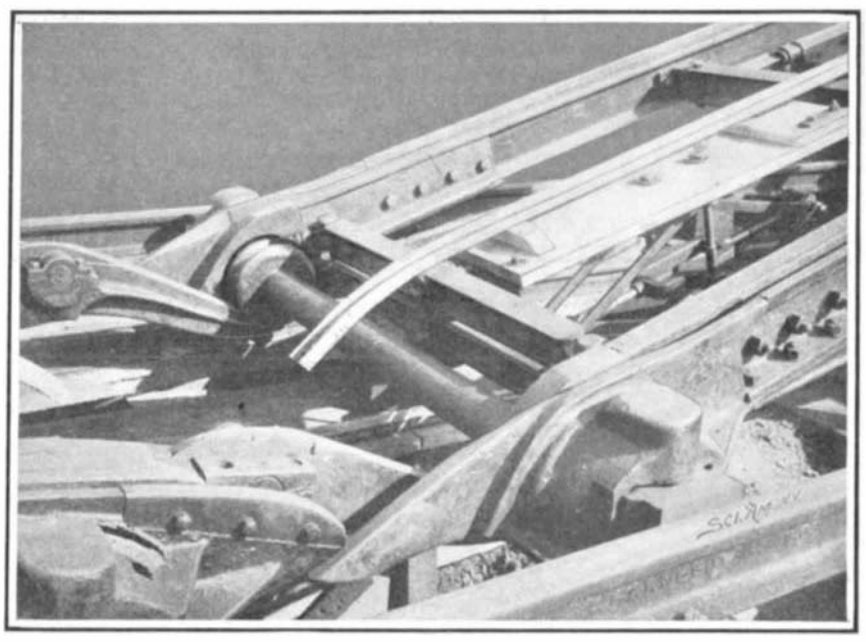
The latest and newest of these is the "Leap-Frog" Railway, illustrated in the accompanying engravings. Its name describes exactly what this remarkable railway does. Two electric cars, each carrying 32 to 40 comfortably-seated passengers, meet in a head-on collision while traveling along a single track. Instead of the smash-up, with its consequent horror of torn and mangled beings that would ordinarily ensue, one of these cars easily and gracefully glides up a set of curved rails with which the roof of the other car is provided, passes over it, and slides down to the track beyond. Mr. Philip K. Stern, an engineer of New York city, invented, designed, and personally superintended the construction of the "Leap-Frog" Railway. Strictly speaking, the device is not absolutely new, and many of our readers are familiar with the idea, as it was described and illustrated by photographs from Mr. Stern's working models, in the SCIENTIFIC AMERICAN of a year or two ago. This, however, is the first time that the invention has been put into practical use for amusement purposes, and successful tests have demonstrated its feasibility with this object in view.

The "Leap-Frog" Railway, which will probably be open to the public in July, is located in Dreamland Park, on a pier running out into the ocean for a distance of about 500 feet. There are two tracks, which allow the use of four cars. At the shore end, the pier is about 50 feet wide, with platforms and shelters for the passengers, bandstand, ticket-booth, etc. Beyond the platforms the tracks curve inward, and the pier narrows to a width of about 30 feet.

As will be easily understood, the crucial point in the design was the devising of the apparatus to lift the superimposed track of the one car, and to guide that car onto the superimposed track of the other car. It was imperative that this action should take place without jar or pounding, as the great weight of the cars would make the hammering very wearing, if not dangerous. Mr. Stern ingeniously obviates this difficulty by having two sets of wheels to each car, one set of narrower gage placed between and slightly lower than the other set, and correspondingly, four rails to each track. Only one set of wheels of the over-riding car is in use while it is moving over the other car. The superimposed track or overswitch, with the surface of the roadway, virtually forms a large vertical switch, analogous to the ordinary railroad side-turnout. It is in three sections, which are joined by hinge connections at each end of the upper part of the car. One of the outside sections is the so-called "pilot," the other the "skid." As the cars come together, two steel switch-tongues at the ends of the pilot rails slide underneath two small double-flanged wheels at the end of the skid rails of the other car, and lift the latter rails. The above-mentioned wheels are located inside of the small wheels at the ends of the incline sections, which keep these upon the rails and support the over-riding car. By using two sets of wheels and employing but one of these for the over-switching, the action becomes a smooth, rolling lift, obviating all jar and concussion. The superimposed track consists entirely of 82-pound rails, the heads provided with grooves, similar to the standard-type, curve guard rails in use on street railways. The wheels of the over-switching set are correspondingly provided with central, circumferential flanges, which travel in these grooves for the obvious reason that the over-riding car may descend from its elevated position in no manner other than that intended by the inventor. It was necessary that the pilots and skids should possess sufficient rigidity to keep the rails always in their proper relative positions, with their vertical planes parallel, but still have enough play to allow for all possible irregularities in the track or distortion due to unequal loading. The inventor, for this purpose, designed a special system of universal jointing, which permits of lateral movement of the pilots and skids in rounding curves, a vertical rotary movement allowing the upward and downward swing of the over-switching system when the over-riding car is traversing the subjugated car, and an independent movement of each of the rails comprising the over-switching system in approximately a vertical plane, while at the same time any gyration of these members is restrained. During these movements the gage of the track formed by these members is maintained by a system of steel ties, which are secured to the rails by the universal jointing system referred to.

The framework of the car which bears the over-switch track is built according to a well-known system of bridge construction. The limited space at our disposal makes it impossible to describe this construction, but we may say here, that it is efficient, rigid, and comparatively light. That great strength is necessary can be seen from the fact that each car, without motors, weighs 28,000 pounds. The steel framework is carried by lateral bridge trusses, and the whole structure, comprising car-bodies, trucks, and over-turnout track, is elastically mounted on the journal boxes by means of differential springs. The axles are 4 inches in diameter, except at the journals, where this dimension is increased to 5 inches. The journal boxes, which are of special design, are placed between each two wheels of the two different sets. The wheel base is 15 feet, the length over all, from pilot to skid, about 49 feet. The wheel base was so designed that the weight of the superimposed car is never completely on the skid or pilot rails.

The motive power is furnished by two 30-horse-power General Electric motors to each car. Five hundred and fifty-volt, direct current is used, about 250 amperes being necessary to drive the car up the incline. The current is led to the motors by means of a channel rail between the track rails and a special grooved contact wheel. The contact is maintained throughout the travel of the car, the superimposed track being also provided with a third rail. The position for the operator is in the center of the framework under the over-



The Pilot Picking up the Skid Rails of the Over-Riding Car.

THE "LEAP-FROG" RAILWAY.

switch track. Here are located, besides seats for several passengers, an ordinary electric controller and a simple but powerful, link-suspension hand-brake. By means of this brake, which acts upon the inner set of wheels (for these are in action on the grades) the car can easily be stopped and held at any point of the incline, which has a maximum slope of 16 deg.

The passengers are carried in the car bodies, which are hung on each side of the framework, the seats, as shown by the illustration, facing outward. It was, of course, necessary that the cars be made as low as possible, in order to diminish the difficulty of over-switching. Consequently, the bodies were made just high enough to conveniently seat the passengers, and a simple system of hand levers raises the roof and lowers the footboard for the ingress and egress of the travelers. The shape of the body is such that the base of the superimposed car just clears the roof of the lower one. The altitude of the curve, the distance from the roadway rails to the over-switch rails, is just 6 feet 3 inches.

The cars will be brought together at a speed of about eight miles an hour. At first glance, it would appear that the cars would pass each other at a rate of speed just double this, but a moment's thought will show that this is an error. The inclined rails actually come into contact at this double rate of speed, but the instant the over-riding car passes onto the inclined rails, this ceases, and the rate at which the cars move by one another is the original eight miles per hour. It appears strange to see the over-riding car actually carried back in the opposite direction for a brief time, but this actually happens, the fact being due to the decrease in the speed of the travel while the car is moving up the incline, notwithstanding that a great part of the load is taken off the motors of the over-riding car, as during the superimposed position the track is also traveling in the direction of the rotation of the wheels.

Prizes for Essays on Lead Poisoning.

The Internationales Arbeitsamt, in Basel, Switzerland, has offered the following prizes for essays on means of combating lead poisoning:

1. A prize of 5,000 marks ($1,190) for the best essay upon the most practical method of eliminating the danger of lead poisoning during the process of handling lead ores.

2. A prize of 10,000 marks ($2,380) for the best essay upon the elimination of the danger of lead poisoning in lead-smelting works.

3. Two prizes, one of 2,500 marks ($595) and a second of 1,500 marks ($357), for the best essays upon the elimination of the danger of poisoning in chemical and electrical works where lead is in use.

4. Four prizes, one of 1,500 marks ($357), a second of 1,000 marks ($238), and two of 750 marks ($178.50) each, for the best essays upon the most practical method of avoiding lead poisoning in trades such as painting, enameling, etc.

5. Four prizes, one of 1,500 marks ($357), a second of 1,000 marks ($238), and two of 750 marks ($178.50) each, for the best essays upon the elimination of the danger of lead poisoning in factories where large quantities of lead are used, as, for instance, in type foundries, printing establishments, etc.

The essays must contain a systematic description of the source of lead poisoning, in which the mode of production is described and the dangers existing in each stage of the process, in transportation, etc., are mentioned. Other causes of lead poisoning are also to be given, as, for example, working too long at a certain process, uncleanliness, insufficient knowledge on the part of the workmen, bad or insufficient food, irrational mode of living, and unhealthy apartments.

The proposals made must give the possibility of elimination of the danger in such a manner that no objection can be made on technical, hygienic, or economic grounds. The dangers are to be given, so far as possible, in classes, in order to make it clear at what stage of the process or under what conditions there is greatest and least danger.

In proposals for new apparatus or alterations in process, the cost and saving involved in such proposals must be given. It is preferable that the essays contain proposals for improving the existing laws upon this subject in all states, and the alterations in legislation which would be necessary to carry out the proposals. They could also contain copies of proposed instructions to be posted in factories for the guidance of workmen. Works containing existing laws on this point can be found in most important public libraries.

Papers may be written in English, French or German. Printed books will not be admitted. The completed manuscript must simply bear a title on the cover. The name of the author is to be inclosed in a sealed envelope which bears the title of the essay. The essays must reach the Internationales Arbeitsamt in Basel by December 31, 1905. The Internationales Arbeitsamt will have the right to publish the prize essays, although the author retains the right of literary ownership. Articles not published will be returned to the authors.

All communications must be addressed to "Das Internationales Arbeitsamt, Basel, Switzerland," and should be sent by registered mail.

A curious point in patent law was recently raised before Mr. Swinfen Eady in the English courts. In an infringement action, the defaulter was stated to have manufactured a patented article without the requisite license. The patent in question was for a wheel to be fitted in solid India rubber tires. In the invention it was possible to replace the tires when worn out, as they could be fitted into a groove in the iron or steel rim of the wheel. This the infringer had done, and claimed his right to do so, as he was merely repairing a patented article. The court held that "it is a question of fact in each case whether the work which has been done may be fairly termed a 'repair,' regard being had in each case to the exact nature of the invention. The purchaser of a patented article has a right to prolong its life by fair repair, but he has not any right to obtain, without license from the patentee, a substantially new article made in accordance with the invention, retaining only some subordinate part of the old article, so that it may be said that the combination is not entirely new. Such a retention of an old part would be colorable only, and would prevent the article from being substantially a repair of the old one."