Correspondence.

Broken Rails.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of the 20th ultimo you brought out an article on "Broken Rails." Since then the New York press has taken this matter up, as well, and it has thereby received some publicity. I have not noticed any further article in your paper, and would therefore suggest that you give your readers all the information on this score which it is possible for you to do. There is nothing that will cure so stupendous a fraud as this, perpetrated on the public, who are really the owners of the railways, and therefore the purchasers of rails, as the truthful and persistent exposure of the methods by which this fraud is enacted. Among an intelligent public, you have an excellent opportunity for exposing these facts. RUDOLPH R. HOFFMANN.

Brooklyn, N. Y., May 1, 1907.

Railroad Accidents.

To the Editor of the SCIENTIFIC AMERICAN:

The illustrated article on page 232 of the March 16 issue of the SCIENTIFIC AMERICAN, in regard to railroad accidents occasioned through neglect, carelessness, forgetfulness, or whatever may have been the fault, is remindful of quite too many similar accidents—similar in the fact of the same cause—within the recollection of all who have had much to do with the operation of railroad trains.

The article, aside from the meritorious criticism of the common practice of placing lightly constructed equipment between two that are much stronger and heavier, and the deplorable necessity that exists for maintaining "facing switches," further illustrates the lack in advancement and the weakness in conditions that will permit frequent repetitions year after year, and continue placing extremely hazardous responsibility and dependence on the fallibility of the human mind.

Quoting from the article: "It is certain, however, that greater precautions could be taken to safeguard such switches." It is remarkable that, with the many improvements in rolling stock and appliances tending to betterment of the commercial interests of railroads, there has been so little advancement in the facilities and appliances that constantly and fearfully menace public safety in travel. True, the automatic block signal system is a great advance over the primitive methods of "by rule and by guess," yet it is the one pronounced improvement toward safety in travel, that is not more a change of "rules" than appliances. The improvement in construction is splendid, so far as it goes, but when improved construction is placed next to the inferior, the benefit is mostly lost in the test, while the danger is greatly intensified.

The only improvement in switches that has been effected in the past forty or fifty years, was the substitution of the "stub" by the "split" switch; and practically no change whatever in the switch stand, except as to pattern and the revolving staff instead of the "throw lever"—simply change as to ease of operation, not adding a particle to the safety of passing trains. The signals are the same, as to effectiveness, and just as impossible of discernment—even more so, with the greatly increased speed and fewer stops.

With the many, constantly increasing duties required of the engineer, and the frightful speed exacted of him, the unceasing wonder is that he distinguishes the multitude of signals he encounters. The fact is, that he proceeds on faith that every man is faithful in his duty, as it is impossible that he can see every insignificant switch target at sufficient distance to enable him making the stop if it is set wrong. The contention is well taken: "Not only should the switch signals be mounted on a lofty post, but a lofty distant signal should be provided." Better than the last, would be a distant alarm signal that would operate a loud-sounding gong in the locomotive, through wheel contact.

While "facing" switches are necessary with single, and not with double tracking, the liability of "wrong switch" is still to be considered. Local and slow trains are required to clear the faster, in passing. The difference would be, in a forgotten switch, that the collision would be rear instead of head on. The fatality could be as great, or greater.

The remedy is not in more stringent rules, nor altogether in certain signaling, but in more assured switch closing. How is that to be done? Certainly through automatic mechanical action. Allow me to suggest that the proper and normal position for a switch should be *closed*, and under no circumstance should it be possible to *leave* it in an open position. Were this adopted, it would not be necessary to protect against open switches, as there would be none. It would be necessary, however, to make it a penal offense to, at any time or for any purpose, use means of fastening open; and it would be necessary that the person operating the switch should hold it open during the passage of wheels through.

This may be accomplished by a gravity mechanism, that, as soon as released from the hand, would fall to the normal or closed position. This operation of opening during necessity could be made secure, just while being held open, by means of a secondary gravity clip that would effectually lock the switch open only so long as the switchman retained it in his hold.

A remiss duty would seldom cause more than simple derailment of a few trucks or cars, under the customary use of switches. E. S. CRULL.

Sedalia, Mo.

A THEATER AUDITORIUM TURNED INTO A BALLROOM AT A MOMENT'S NOTICE.

The problem of a ballroom sufficiently large to house a considerable number of dancers, or to provide space for banquet tables, has been solved in a more or less satisfactory manner by boarding over the orchestra and parterre of the theater or opera house. Such makeshift is necessarily clumsy and unsatisfactory. Horses, framing, and boarding must be stored at all times, affording excellent food for fire. Much time and expense is entailed in erecting the flimsy temporary structure each time it is used. A French inventor, Dr. Eugène Gravelotte, conceived the rather brilliant idea of applying the principle of the waffle iron to the floors of theaters, and a new Paris music hall in the Rue de Clichy has been provided with this somersaulting orchestra floor, which can be changed in seven minutes from the usual conventional inclined floor with comfortable chairs to a horizontal, highly-polished dance floor. The carcass which holds the twin floors in a parallel position revolves about a horizontal axis in a pit permitting of a complete revolution.

Our front-page engraving gives some idea of this audacious transformation. The dimensions of the revoluble sections of the floor are as follows: Length, 53 feet; width, 50 feet; and the depth of the pit is 30 feet. Metallic trunnions or pivots are secured to the carcass. On one of the two twin floors are nineteen rows of orchestra chairs. There is a difference in level of some 7 feet when the dance floor is in use. Steps lead down from the foyer. The mechanism for making the transformation is very simple. Up over the proscenium are motors which actuate drums around which are roved steel cables, which are in turn roved around the trunnions. The principle is the same as winding a string upon a lead pencil. When the string is pulled the pencil revolves. The total weight of the construction is 90 tons, yet so well is the floor balanced that a 2-horse-power motor is all that is required, and the cost of operation is only eight cents for each transformation. The installation cost the moderate sum of $14,000, of which $9,000 was used for building the carcass, the floors, and the operating mechanism, and the balance was taken up in excavating the pit and in the masonry. The greatest difficulty connected with the installation was to find an engineer with enough courage to make the necessary calculations for the realization of the idea.

The Current Supplement.

For the fourth time there were held at Monaco, from the 2d to the 14th of last month, the Motor Boat Show and Races that have come to be the great annual spring event in Europe. The races this year were noted for the record of the Panhard boat, which kept up a speed of 30 knots for three hours, the best performance ever made by any motor boat. In the current SUPPLEMENT, No. 1636, the Paris correspondent of the SCIENTIFIC AMERICAN thoroughly describes these races and gives details of the feats of the individual boats. Illustrations of the more prominent types accompany the text. Of technological interest are articles on the "Slaking of Plaster and Means of Retarding Its Hardening," "Waste Products from the Manufacture of Glue," "Process of Producing Plaster Free from Bubbles," "The Manufacture, Denaturing, and the Technical and Chemical Utilization of Alcohol" (the first of two splendid installments on this subject by M. Klar, a well-known German alcohol chemist), and "The Powell Process of Preserving Wood with Saccharine." A new telephone dictating apparatus, invented by Turner and Germer, is described. "What is a Watt?" is the title of an article by George S. Hodgins, which explains clearly the meaning of this electrical term. Among flying-machine experimenters there is about as great a diversity of opinion on air-propeller shapes as there is a dearth of actual knowledge of their efficiencies. For that reason Mr. A. M. Herring's article on an air-propeller testing device should be particularly welcome, inasmuch as Mr. Herring is himself a well-known aeronautical expert. "A Quarter Century's Progress in the Applications of Electricity," is the title of a splendid review of modern electrical achievements. Dr. Alfred Gradenwitz writes on a German system of compressed-air cleaning. The intensity of the tropical sun and its effect on the human body is discussed by Surgeon-General Stendel. Joel A. Allen writes on the influence of physical conditions in the genesis of species.

The Wellman Expedition to the North Pole.

BY THE PARIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Mr. Walter Wellman has already made his plans for the expedition to the North Pole which he expects to make during the coming season. He states that the steamer which is to take the expedition to its starting point in the Danish islands has already arrived at Trondhjem, Norway, where it is now lying in dry dock, and it will be ready to leave for Spitzbergen about the first of June. The party which is to proceed to the islands is made up of some thirty-five persons. The sleds are to be drawn by dogs coming from the north of Siberia from the Samoiedes tribes dwelling on the banks of the Obi River. As to the airship, of which we already gave an illustrated account some time since, it has been entirely rebuilt in the Mallet aeronautic establishment at Paris. According to the present design, it measures 55.8 meters (183.7 feet) in length, with a middle diameter of 16 meters (52.8 feet). The volume of the balloon is 7,500 cubic meters (9,825 cubic yards), and it will have an ascensional force of 8,870 kilogrammes (19,515 pounds). Near Paris is being constructed a new nacelle which is built entirely of steel, with a motor and improved mechanical parts for the helice, these having been designed by Mr. Wellman. The mechanical design has some original features which differ to a great extent from what has been hitherto constructed for airships. Built of steel tubes which give it lightness as well as stiffness, the nacelle has a total length of 115 feet. Together with the steel part is built a large reservoir which is expected to contain all the gasoline needed for the trip to the pole and return, this being 6,800 liters. As regards the principal motor mounted on the nacelle, it is rated at 60 to 70 horse-power. Directly mounted upon the motor shafting are two helices of steel having 11.5 feet diameter, and there is one such helice at either end of the nacelle, resembling in this respect the design which is adopted by the Lebaudy brothers in the airship "Patrie." A good speed is expected to be made by the new airship, this being calculated at fifteen to eighteen miles an hour, and there will be enough fuel in the reservoir to give a continuous flight of 150 hours at full speed. This is expected to allow the airship to cover a radius of 2,000 miles, and is nearly double the distance from Spitzbergen to the pole and return, so that there is a good margin allowed. All the mechanical parts have been put through a good series of practical tests for some time past. When the airship is entirely set up at Spitzbergen during the month of July next, a series of trial tests will be made of the whole before setting out upon the trip. Mr. Wellman does not think it advisable to make the trial tests of the balloon at Paris before taking it to the Arctic regions. At first he intended to do so, but was brought to a different conclusion after considering the matter. Should this be done he could not make the expedition this year, as a balloon shed would have to be built and other arrangements made which would take a great deal of time, and again these tests would not be decisive at any rate, seeing that the airship must be taken apart for transportation for several thousand miles and then set up again. To be sure that all was right, a new set of trials would need to be made on the spot after assembling it. As the airship is designed for use in the Arctic regions and above the ice, the conditions are special, and it would need to be tested on the spot. The new airship "America" will carry quite an amount of load, seeing that besides the machinery and 3½ tons of gasoline there will be four or five men for the crew, about a dozen dogs for the sleds and all that will be needed should they be required to make the return trip on the ice; added to this there are 1½ tons of provisions, so that the crew could pass all the winter in the Arctic regions. The material which is used for the balloon seems to be of first-class quality and according to recent tests made upon it, not more than one per cent of hydrogen would be lost during twenty-four hours. Even should this amount rise as high as two per cent per day, Mr. Wellman estimates that he could continue in the air for about twenty-five or thirty days without difficulty, keeping the balloon swelled out by the interior ballonet. His present plan is to arrive at Spitzbergen during the first week of June and thus to make a series of trial flights during the month of July, leaving for the pole about the first half of August.

Hydrofluoric acid as a cleaning agent for castings has been in general use but a short time, being treated a few years ago as a secret process. Formulæ for the acid containing superfluous and innocuous ingredients to mystify the purchaser have been sold for considerable sums. Anything used in connection with this "pickle," aside from the hydrofluoric acid and water, is wholly unnecessary, the usual formula being one part of acid to ten of water. In adding water, however, care should be taken to know the strength of the acid. The idea is to get a dip that will remove the sand perfectly and quickly, the operation requiring ten to fifteen minutes.