AN ELECTRIC ALARM TRY-COCK FOR STEAM BOILERS.

A very ingenious arrangement for sounding an electric alarm when the water in the boiler has fallen below a safe level, has been introduced by the Electric Boiler Protection Company, of 9-13 Maiden Lane, Manhattan, New York city. The device is a safeguard against explosions or injuries to any steam boiler made.

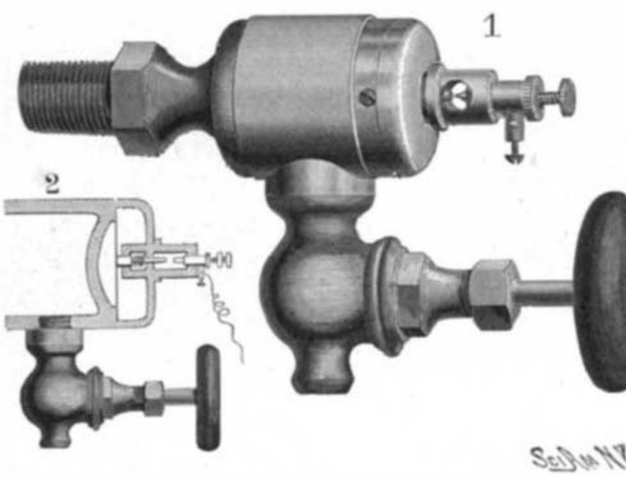
Fig. 1 represents the apparatus in perspective. Fig. 2 is a partial section.

The lower try-cock is provided with an expansion chamber, composed of a concave wall and a diaphragm hermetically sealed together. The diaphragm is designed to engage a spring-pressed plunger carrying a contact point, which, when it touches the opposite contact point of binding post, completes the electric circuit.

When the water in the boiler is above the level of the try-cock, the parts will be in the position shown in Fig. 2. But when the water in the boiler sinks below the normal level, steam enters the try-cock, heats the air in the expansion chamber, forces the diaphragm against the plunger, which in turn completes the circuit as it touches the contact carried by the binding post. The alarm sounded will immediately inform the attendant engineer that the water in his boiler has sunk dangerously low. The cooling of the air in the expansion chamber returns the parts to their normal positions.

As many alarms as may be desired can be disposed about the building. A group or nest of boilers protected in the manner described, may be wired to an annunciator, thereby showing which boiler needs attention. Switches can be provided to cut off the alarm, until the cocks cool off, thus saving battery current and the unnecessary noise of incessantly ringing bells.

The device takes the place of the lower try-cock, and can be attached to any boiler in a few moments.



ELECTRIC ALARM TRY-COCK FOR STEAM BOILERS.

THE CREEPING OF RAILS ON THE EADS BRIDGE, ST. LOUIS.

In response to our inquiry as to the exact amount of rail creeping on the Eads Bridge and the means adopted to accommodate it, we have received the following very interesting letter from Mr. N. W. Eayrs, the superintendent of structure, who replies as follows:

"I have your letter of the 8th inst., making inquiry about the amount of rail creeping on the Eads Bridge. This movement of the rails occurs not only upon the spans, but also upon the east approach trestle; the movement on the latter is, however, considerably less now than it was before the trestle was reconstructed. The original structure was very light, and in consequence there was an unusual amount of elasticity in the floor. The creeping occurs always in the direction of the traffic; that is to say, the west-bound track runs west and the east-bound track east, and varies in amount with the variation in tonnage passing over the rails. The movement is dependent on the elasticity of the track supports; with increased stiffness in the floor system the amount of rail movement is decreased; in fact, several years ago a portion of the east approach trestle, a wooden structure about 1,000 feet in length, was filled and the track put on the ground. In this portion the rail movement almost entirely disappeared. As corroborating my opinion that the rail movement is caused by the elasticity of the road-bed, I may mention a section of track on the Canadian Pacific, which was laid on a soft marsh. If my memory serves me rightly as to the amount, this section of track moved two feet under a single train.

In the month, April 15 to May 15, 1899, some measurements of the movement were made at two points, one on the center span of Eads Bridge, and one at the west end of a 5° 43′ curve on the east approach. The movements were as follows:

	Eastbound Track.		Westbound Track.	
	North Rail.	South Rail.	North Rail.	South Bail.
Center span....	17 ft. 10½ in.	19 ft. 4½ in.	19 ft. 9⅝ in.	12 ft. 7½ in.
East approach..	25 " 9 "	47 " 7 "	33 " ½ "	34 " 2¼ "

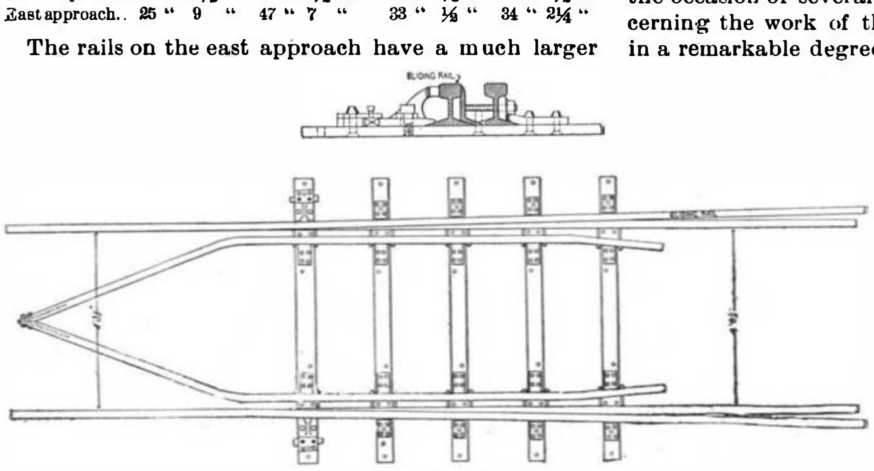
The rails on the east approach have a much larger run between creeping points than on the bridge, which accounts for the increased rail movement.

Attempts were made at one time to check this movement, but it was found inadvisable to continue the experiment, as the strain on the fastenings was sufficient to tear fish-plates in two, or to shear off a ⅞-inch track bolt. Accordingly the track was kept continuous by inserting pieces of rail of various lengths at the end where the movement commenced, and removing corresponding pieces at the other end. At either end of the bridge there are cross-overs which of course must be kept in line; at these points, therefore, the rail movement required control; there are also two points on the east approach on each track which require protection. Accordingly there are eight "creeping plates" as we call them, in the track.

In order to avoid the necessity of keeping a supply of pieces of rail from 2 inches long to 30 feet long at each place, and to dispense with the necessity of keeping a trackman to watch these places, we put in, about fifteen years ago, a device which is shown on the accompanying drawing. This device consists of a pair of switch points, rigidly held to gage by forming part of an iron frame which is bolted to the ties. The main rails of the track which is ahead of the device—that is, in the direction of the traffic—extend outside of the switch points. A full rail is coupled on to the main rail, which, in the case of a trailing point, drags the rail through the jaws, or, in the case af facing points, shoves it through the jaws. In the former case, when the rail has nearly passed through, a new rail is coupled on, and in the latter case the rail is uncoupled as soon as it has passed through the creeper (or the "Irishman" as the trackmen call it, since it takes the place of the Irishman formerly employed). The rail which has been shoved through the creeping plate and has been taken off, is carried across to the opposite track to be used to feed into the creeping plate, and begins to travel back again.

The force impelling the rail is so strong that it will drive a straight 70-pound steel rail through a 5° 43′ curve, curving the rail during the passage and straightening it again after the rail comes through.

The movement on the spans can probably never be entirely overcome, as the deformation of the arched ribs under the action of a moving load intensifies the action of the elasticity of the track."



"THE IRISHMAN."

Device used at each end of the Eads Bridge to switch the creeping rails out of the track, and introduce the new rails.

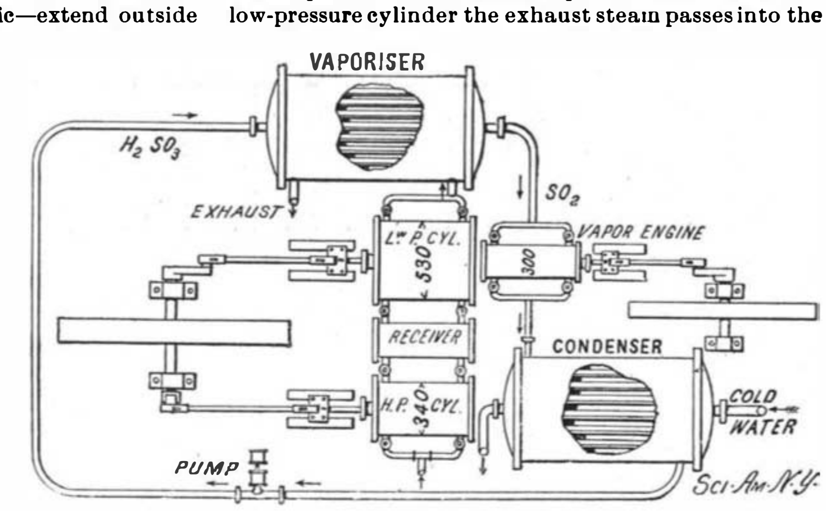
A NOVEL FORM OF STEAM ENGINES.

The recent centennial anniversary of the Royal Technical High School at Charlottenburg was made the occasion of several important announcements concerning the work of that institution, which embodies in a remarkable degree the advanced technical science which has done so much to push Germany forward into the front rank of manufacturing nations. Among these is the paper of Prof. E. Josse, head of the mechanical laboratory, in which are described with elaborate detail the results of his experiments with an original and highly interesting process for increasing the efficiency of steam engines by utilizing the heat of the exhaust steam for evaporating another liquid having a lower boiling point than water. This paper is made the subject of a special report by Consul-General Frank H. Mason and we take pleasure in publishing an abstract of his paper.

The process is the joint discovery of Mr. G. Behrend, a Hamburg engineer, and Dr. Zimmermann, of Ludwigshafen.

It is plain that, with all progress which has hitherto been made in steam engine practice through higher pressures, superheated steam, economical cut-offs, or successive cylinders, there is always an important and inevitable loss of heat energy when the steam, having done its work, is discharged into the open air or changed back to water by contact with cold water in a condenser. When the exhaust is into the open air, the steam has a temperature of about 100° Celsius (212° F.); when it passes into a condenser, the steam has a temperature of 60° to 70° Celsius (140° to 160° F.), according to the vacuum. The corresponding latent heat of steam, given up upon change of form from steam to hot water, has hitherto run to waste in the condensing or cooling water, or in the air. Messrs. Behrend and Zimmermann attacked the problem of utilizing this wasted caloric by employing it to create a new supply of steam by evaporating some liquid which has a lower boiling point than water, and for this purpose they chose, after many experiments, sulphurous acid (H_2SO_3), which is not only cheap and easily obtained, but has the further advantage of a viscous consistency and lubricates the inner working surfaces of the machinery without corroding them. Their demonstrations, although not practically conclusive, were so promising that Prof. Josse, as a technical authority on this subject, took up the problem, and, after several months of highly satisfactory laboratory experiment, caused to be constructed and connected with an ordinary working steam engine of the compound type an additional condenser and auxiliary engine, the power of which could be exactly measured. The whole working apparatus is shown in the engraving herewith submitted, and the technical details will be explained by the drawing, and may be thus described.

Referring to the diagram, in which dimensions are given in millimeters, the high and low pressure cylinders of an ordinary compound steam engine are represented, with a stroke of 500 millimeters (19·69 inches) and a speed of 41·5 revolutions per minute. From the low-pressure cylinder the exhaust steam passes into the surface condenser, called in the diagram the "vaporizer." In this vaporizer, or condenser, the cooling medium used, instead of water, is liquid sulphurous acid (H_2SO_3), which has a boiling point so low that it is immediately decomposed by the heat of the exhaust steam, whereby the sulphur dioxide gas (SO_2) is liberated, which passes over into the cylinder of the auxiliary engine where its work is done as in an ordinary steam engine. The auxiliary cylinder has a diameter of 300 millimeters (11·81 inches) and a stroke of 500 millimeters, with a speed of 77 revolutions per minute.



NEW TYPE OF STEAM ENGINE OF HIGH EFFICIENCY.

After passing through this cylinder, the sulphurous vapor enters the surface condenser, around the tubes of which cold water flows as in an ordinary steam plant. Here the sulphurous vapor is condensed to liquid and is forced by the pump back into the vaporizer, where it begins its cycle again, the same SO_2 being used over and over again indefinitely. There are, therefore, in fact two condensers, the first serving, as it were a boiler or steam generator for the auxiliary engine; and this boiler, instead of being fired by coal, obtains all its heat from the exhaust of an ordinary steam engine, and instead of converting water into steam, evaporates a liquid which is much more volatile—i. e., has a far lower boiling point.

In the long series of recorded tests with the plant shown in the engraving herewith transmitted, the following results were attained:

The steam engine is of the compound type, of good, modern construction, and, being given a steady load, developed 34 indicated horse power, with a consumption of 8·6 kilogrammes (18·96 pounds) of steam per