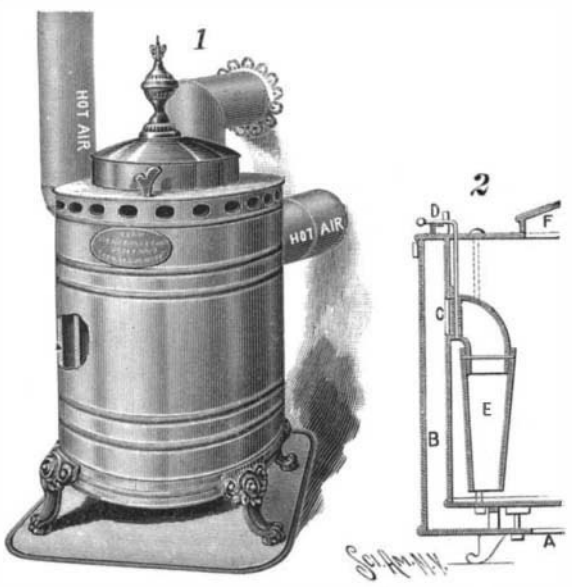
A COMBINED HEATING STOVE AND FURNACE.

The stove which we illustrate herewith is an improvement over ordinary stoves in so far as it serves the purpose of a furnace for distant rooms. In the construction of this furnace-stove only sheet metal is used, whereby the cost of manufacture is considerably reduced and the durability enhanced.

The stove consists of an oval outer casing, formed with a draft opening, *A*, in its bottom. Within this outer casing is a concentric, oval firepot separated from the outer casing so as to leave an air space, *B*, around the firepot. Legs pass through the casing, the inserted end portions of the legs engaging with sockets formed on the bottom of the firepot, to take load strain from the casing. Fuel is introduced through an aperture in a top plate having a cover, *F*, in the rear of which is a circular flange which receives a draft-pipe. The heat of the firepot is distributed to other rooms by hot-air pipes fitting on thimbles on the outer casing. Each of



A COMBINED HEATING STOVE AND FURNACE.

the thimbles is provided with a damper whereby the supply of hot air can be cut off. At the front end of the oval firepot an aperture is formed which receives a draft elbow, provided with a cast iron extension *E*, which can be removed when burnt out. The throat of the elbow is closed by a damper, *C*, controlled by a rod extending upwardly through the top plate.

Fire being made in the firepot, cold air is drawn through the opening, *A*, in the outer casing and is conducted by the draft elbow into the burning fuel. As the firepot is heated the air in the space, *B*, is also heated. This hot air arises and passes through the hot-air pipes into the rooms to be warmed. To permit the escape of the heated air directly into the room in which the stove is placed, the upper portion of the outer casing is provided with a series of openings, which can be closed by a rotatable metal band having similar openings designed to register with those of the casing. By moving the band the casing-openings can be partially or entirely opened and closed.

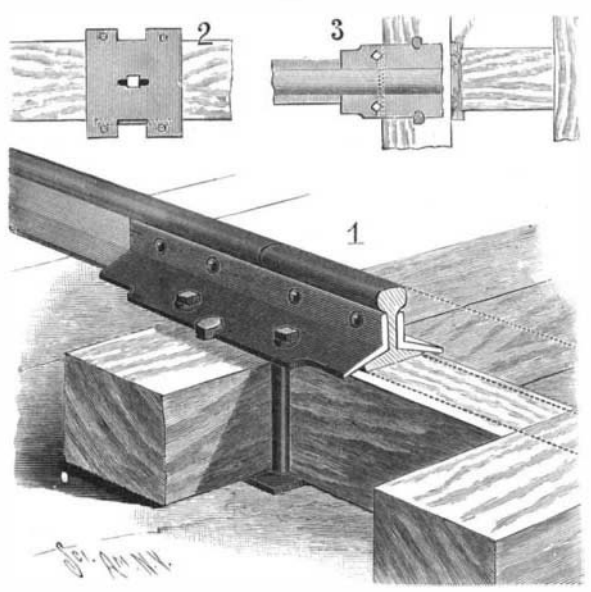
The inventors of this furnace, Wormald & Wormald, of Spokane, Wash., state that the stove has proven its efficiency on many an occasion. The saving in fuel effected by its use is said to be very marked; for one furnace stove is made to take the place of several ordinary stoves distributed in various rooms.

Mural Paintings Emblematic of Electricity.

Mr. W. B. Van Ingen, mural painter of New York, has opened an entirely new field by his large panels which decorate the offices of the Edison Illuminating Company in Duane Street, New York city. Instead of making his figures purely allegorical as does Puvis da Chavannes in the Boston Library, Mr. Van Ingen has taken some very workaday scenes like "Edison in his Laboratory," "Faraday and the Electric Motor," "Sir Humphrey Davy and his Electric Arc Light," and while utilizing them, has still clothed them in enough of the nineteenth century to make them interesting, for they tell the story admirably. There are many large concerns whose offices might be decorated in a similar manner emblematic of their manufactures. The idea is an attractive one and we would like to see it carried out on other industries in the same manner as has been done for electricity.

AN ANCHOR TO PREVENT THE CREEPING OF RAILS.

To prevent the creeping tendency of rails, and yet to allow the track to expand and contract is the object of an invention patented by Severin B. Anderson, of Hartford, Wash. This object is attained by means of the novel anchor represented in the accompanying illustrations. Fig. 1 is a perspective view of a rail with the anchor applied. Fig. 2 is an inverted plan view showing the anchor-plate. And Fig. 3 is a top plan view of a rail with the invention applied. The adjacent ends of rails are joined by angle-iron fish-plates spiked to the tie and bolted to the rails. The ends of the fish-plates project beyond the base of the rails; and through these projecting portions bolts are passed which rigidly connect the fish-plates with an anchor-plate on the under side of the tie. The plate, as shown in Fig 2, is provided with a longitudinal slot; and a bolt extends through the tie and slot to hold the anchor-plate to the tie and permit adjustment of the plate lengthwise of the tie. Between the tie at the joint of the rails and the next following tie, located in the direction of the creeping tendency, is a brace-block formed with a brace-plate which partially embraces the bolts connecting the fish and anchor plates and prevents the wearing of the bolts on the brace-block. On the opposite side of the tie a face plate is provided, upon which the bolts connecting the fish and anchor plates rest. The face-plate serves to prevent the embedding of the bolts in the tie. It will be seen that, although the fish-plates are so firmly locked in place, the rail can, nevertheless, expand and contract. The creeping of the rails is prevented by the means employed for securing the fish-plates. Dislocation of the tie by the creeping of the rails is prevented by the brace-block. The anchor-plate, being transversely adjustable, can be brought in position to insure the proper alinement of the rails. The track can be readily raised and surfaced without any interference from the device.



AN ANCHOR TO PREVENT THE CREEPING OF RAILS.

THE ALEXANDRE III. BRIDGE, PARIS.

BY J. GUENAIRE.

One of the most interesting features of the approaching Paris Exposition will be the handsome bridge which unites the different portions near the Champs d'Elysées, and forms part of the principal avenue, to be called the Esplanade des Invalides. This avenue commences at the Champs d'Elysées, having on either side the great and smaller palaces, and passes over the new bridge. On the left bank of the Seine it will be bordered by a succession of buildings of the Exposition, and will terminate at the imposing structure called the Hotel des Invalides, containing the tomb of Napoleon.

It was decided to give to the bridge the name of Alexander III., in honor of the father of the present Czar Nicolas II., whose visit to Paris, in 1896, consummated the alliance between France and Russia, begun by the late emperor, and it was in the midst of a series of splended fêtes that the Czar assisted at the laying of the corner-stone.

The construction of the bridge presents many points of interest. As will be seen in our illustrations, it consists of a series of metallic arches, whose thrust is received by the abutments on either bank. Accordingly the dimensions and construction of these abutments have been such as to assure great solidity. Each of the abutments forms a mass 44 meters (144·36 feet) wide and 30 meters (98·43 feet) in thickness, being formed of masonry and cement, with an outside covering of blue granite. The whole constitutes a block which offers as much resistance as if it were composed of a single stone.

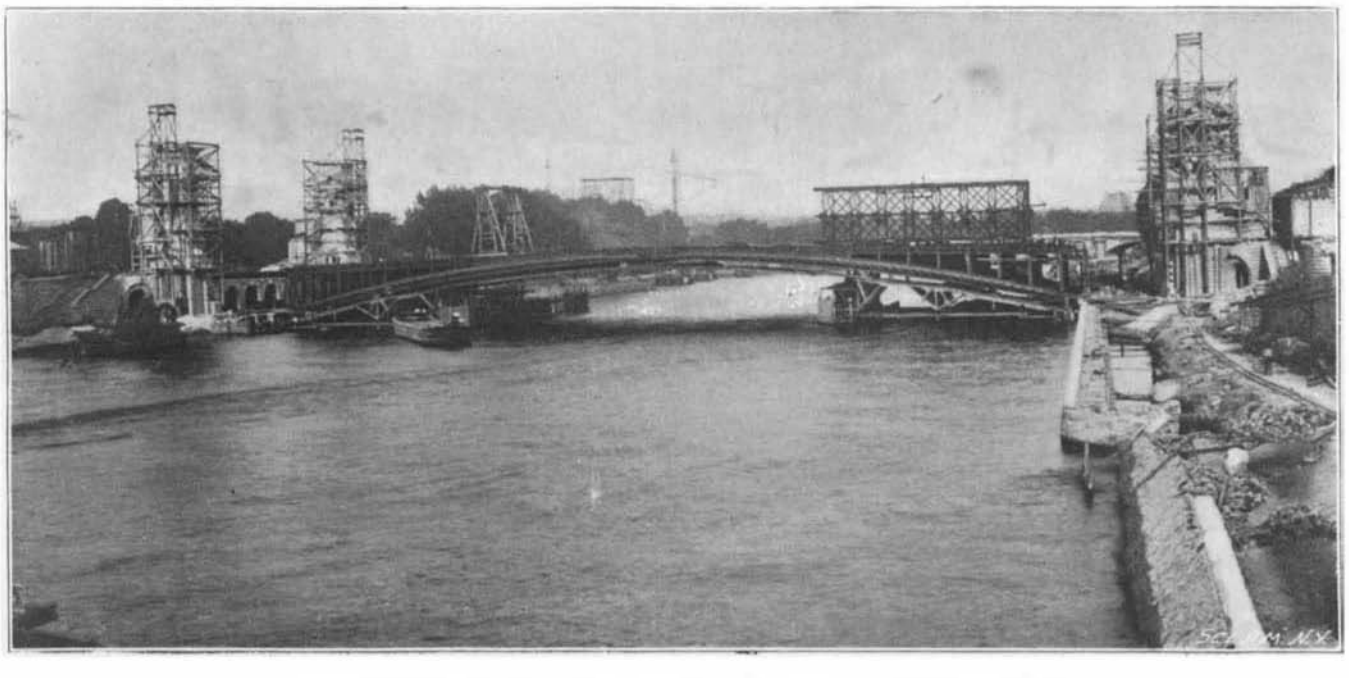
The foundations are separated from the clay stratum here existing in the bed of the river by a certain thickness of sand. As the horizontal thrust of the arches upon the abutments is considerable, the stability of these latter is secured by the effect of the friction of the abutment upon its bed, this being, in fact, greater than the maximum thrust of the arches. Experiments have been made with samples of sand extracted from the strata, and it is found that the coefficient of friction is more than 0·58, and on the other hand the relation between the horizontal thrust and the weight of the abutments is only 0·50. In this way the thrust of the arches will always be more than counterbalanced, and the perfect stability of the abutments assured.

In the construction of the abutments, metallic caissons were necessary; these were of more than ordinary dimensions, and were built upon the spot where they were to be sunk in the stream. The joints were carefully caulked with bitumen and felt, and thus perfect tightness was assured. These caissons, 44 by 36 meters in size, were divided into five compartments, each of these being provided with two shafts or chimneys for the descent of workmen and materials of construction. The material excavated from the bed of the river was taken out by the same shafts and emptied into the stream, from which it was removed by dredging machines. Some difficulty was encountered in the construction of the abutments by these caissons, as it was necessary that all parts of the caisson should sink the same distance as the work progressed. However, by establishing a series of water levels, connected by rubber tubing, a uniform rate of sinking was attained.

After the caissons had been sunk to the required depth in the bed of the river, they were filled with bêton, consisting of a mixture of cement and gravel; this was filled in commencing from the walls and working toward the shafts.

The work of construction of the abutments was commenced on April 19, 1897, and the operation of filling the caissons was finished March 26, 1898. The mean rate of descent of the caissons was about 12 centimeters (4·72 inches) per day. Two important questions were those of furnishing air and light to the workmen. For the lighting, incandescent lamps were used, to avoid vitiating the air in the enclosed space. Two groups of engines and dynamos were installed for the purpose, one of these acting as a reserve in case of accident; each group included a Radsworth engine driving a continuous-current dynamo at 140 volts. Three lines of wiring were used for the interior and exterior lighting, each caisson requiring about 130 lamps.

The essential portion of the abutments having been constructed, the work of mounting the metallic part of the bridge was next in order. In view of the existing conditions of traffic upon the Seine, the arch could not be con



THE ALEXANDRE III. BRIDGE FROM THE RIVER, SHOWING PYLONS.