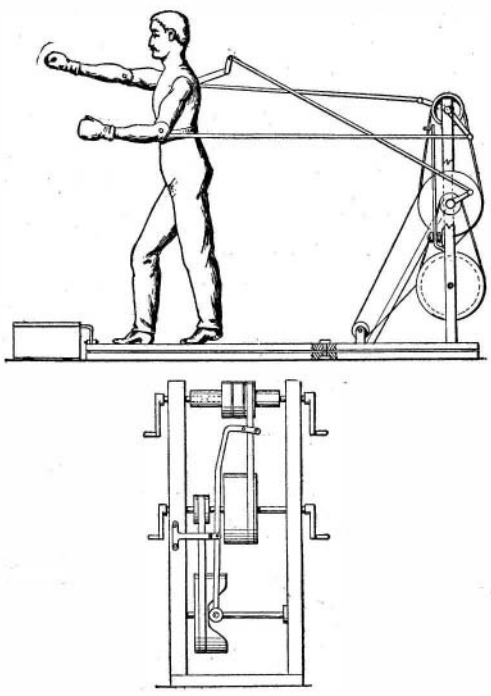
chinery performs even more perfect work than is possible by human hands, and absolute cleanliness of the finished product is insured.

HUMIDORS.—A marked feature in the manufacture of the product of this factory is the care that is taken to keep the cigars in the proper moist condition, which is done by storing them for a certain length of time in humidors. The humidor is a room of special construction, with brick floor and walls, in which the temperature and humidity are maintained at a desired degree. Cigars are liable to become too dry in the process of manufacture, hence, as soon as the wrapping has been done they are taken to the humidor, where they are drawn back to perfect packing conditions. From the humidor they are taken to the cigar packers, where they are carefully sorted according to color and packed in boxes of twenty-five, fifty, and one hundred. The packed boxes are placed in large presses, and left there over night. The next morning they are returned to the humidor, where they remain for a period of from three to six weeks, at the end of which time they are ready for shipment to the dealers.

### A MECHANICAL PRIZEFIGHTER.

To accommodate the needs of the professional boxer, as well as to instruct the novice in the "noble art of self-defense," Mr. Charles Lindsey, of 58 Glen Street,

A MECHANICAL PRIZEFIGHTER.



THE MECHANISM OF THE SPARRING MACHINE.

New Britain, Conn., has invented an automatic sparring machine. This machine is really a formidable fighter, and has already gained quite an enviable reputation in the many encounters it has had with local talent. Not only does it deliver straight leads and counters, but it varies these with an occasional uppercut, and its blows are rained with a speed and power that are the envy of the professional boxer. The machine does not "telegraph," that is, it does not give a warning of a coming blow by a preliminary backward jerk, which is so common to all but the best of boxers. Nor can the opponent escape these blows by side-stepping, because the automaton will follow him from one side to the other. At each side of the opponent is a trapdoor, connected with the base of the machine in such a way that when he steps on one or other of these doors, the machine will swing around toward him. The arms of the mechanical boxer are fitted with spring plungers, which are connected with crank handles turned by machinery. Separate crankshafts are used for the right and left arms, and they carry pulleys between which an idle pulley is mounted. These pulleys are connected with the main driving pulley by a belt which is shifted from side to side, bringing first one and then the other of the boxing arms into action. The belt-shifter is operated by an irregular cam at the bottom of the machine, and this gives no inkling as to which fist is about to strike. Aside from this, the body of the boxer is arranged to swing backward or forward under the control of an irregular cam, so that the blows will land in different places on the opponent; for instance, a backward swing of the body will deliver an uppercut. The machine is driven by an electric motor, and can be made to rain blows as rapidly as the best boxer can receive them, or it may be operated slowly for the instruction of the novice. As the machine is fitted with spring arms and gloves, an agile opponent can ward off the blows and thus protect himself.

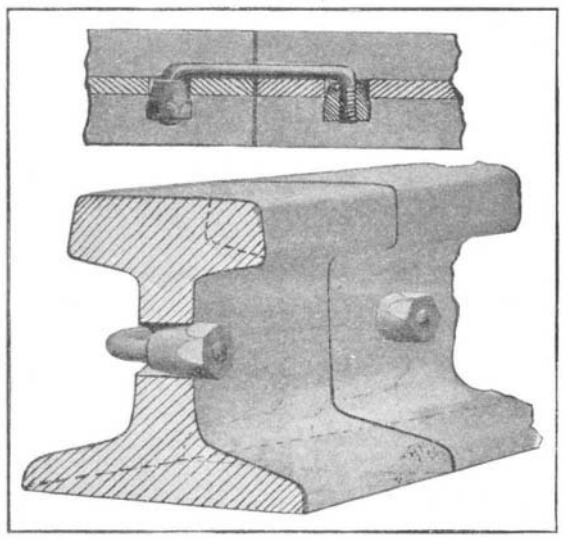
### AN IMPROVED TURBINE.

Turbine engines of the Parsons type, in which the steam passes continuously through the engine in the general direction of the axis, are formed with a series of circumferential enlargements of both the shaft and the casing, in order to provide for the expansion of the steam. This construction offers the objection that each enlargement of the shaft or spindle presents a shoulder or abutment, on which the steam acts to produce a powerful end thrust. In order to balance this thrust, it is customary to provide the spindle with a series of thrust rings, against which the steam presses in the opposite direction. In the accompanying engraving we illustrate an improved form of turbine, in which the steam acts upon the center of the spindle out toward the opposite ends, so that the thrust of one half of the spindle will counterbalance that of the other. Furthermore, to allow for expansion of the steam, the cylinder is formed of two frustro-conical sections with their smaller ends connected. The shaft is of uniform diameter throughout, but beginning at the center the blades of each row are made longer than those of the preceding row, to correspond with the conical casing. Near the ends of the spindle, where the blades would be dangerously long if they extended all the way to the casing, a circular flange is used, which divides the blades into two concentric rings. Instead of feeding the steam from a single point through the entire series of blades, means are provided for admitting steam to each row of blades individually. It will be observed that the turbine is formed with two casings, namely, an outer one, *A*, and an inner one, *B*; reference has already been made to the latter as being formed of two frustro-conical sections. The space between the two casings forms a steam reservoir for a series of stationary inlet tubes, *D*, which project inward between the rows of blades on the spindle, *C*. These tubes are slotted at the forward side, and through these slots the steam is directed against the blades. Each tube is also provided with a wing extending rearwardly, and serving as a stationary blade to direct the steam from one row of movable blades to another. Thus, aside from receiving a fresh supply of steam from its own series of tubes, each row makes use of the steam passing through the preceding rows. The inner rows of blades are designated at *E* in the engraving, while the outer double-decked rows are indicated at *F*. The tubes which supply the rows *F* are short and feed steam mainly to the exterior blades of these rows, being practically cut off from the interior blades by a ring or circular bottom wall. Within the ring are a series of stationary blades, *G*, which serve to conduct the steam from the blades *E* to the interior blades, *F*. A patent on this improved turbine has been secured by Mr. George L. Mundigler, of West Allis, Wis.

A new process of manufacturing hollow tin soldiers so popular a toy with children has been successfully devised by an English firm. Hitherto this product has been practically a German monopoly, the soldiers being cast solid. By means of this new process, however, the toys are cast hollow, and are some sixty per cent lighter than the German article, while owing to the reduction in the amount of metal and the speed with which the work can be carried out, the articles can be produced much below the German figure. As a result of this discovery the German trade with England which has hitherto been of great proportions is rapidly declining, while the toys are of stronger construction owing to the utilization of a more stable metal.

### IMPROVED RAIL BOND.

A patent has recently been secured by Edwin W. Robinson, of Punxsutawney, Penn., on an improved rail bond for electric railways. The new bond is arranged to insure an exceedingly firm electrical connection between adjacent rails, and in a very simple and economical manner.

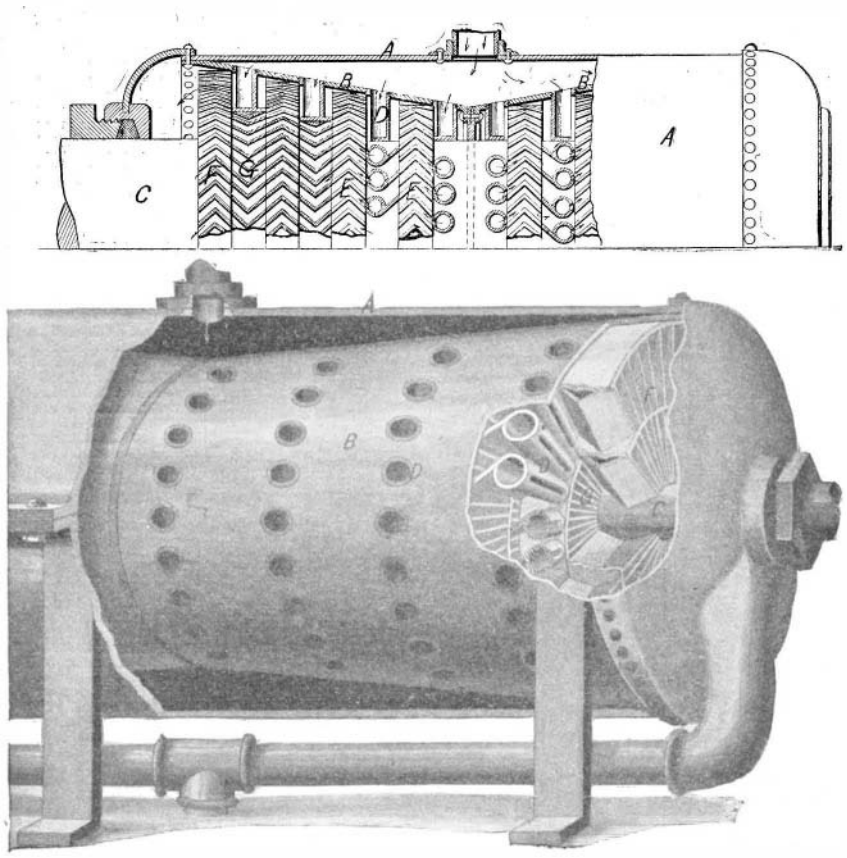


AN IMPROVED RAIL BOND.

The invention will be clearly comprehended by a glance at the accompanying engraving. It comprises a conductor in the form of a rod, which is bent to enter holes in the webs of two adjacent rails. The ends of the rod are threaded to receive a pair of nuts, which enter the holes in the webs. The nuts are formed with frustro-conical ends, and as the nuts are screwed up on the rod, they not only draw the rod into close contact with the webs of the rails, but also wedge their frustro-conical ends tightly into the holes in the webs. This insures an exceedingly good electrical connection between the adjacent rails. It will be evident that the new rail bond can be applied to rails as now constructed.

### Wanted: A History of Physics.

There are great histories of mathematics and great histories of astronomy, but no history of physics on a grand scale. Some serviceable manuals there are, as well as monographs on particular topics; what seems to be lacking is some comprehensive and comparative survey of the whole range. The history of any of the natural sciences, like the history of human activity, is not merely an encyclopædic record of past facts; it reveals both the spirit and the wealth which the past has bequeathed to the present, and which, in due course, the present will influence before transmission to the future. Perhaps all our physicists are too busy to spare the labor needed for the production of a comprehensive history; yet such a contribution to the subject would be of great value, not to physicists alone.



AN IMPROVED TURBINE.