immense amount of almost 15,250,000 pounds. The number of mills is about 1,200, and not more than 30 per cent. of them are fitted with steam power, so that they are liable to be interrupted by drought.

An interesting and successful trial of an electric locomotive designed and built by the Thomson-Houston Motor Company, for hauling freight cars, was made at the company's works, at West Lynn, Mass, a few days ago. The machine was built for the Whitin Machine Company of Whitinsville, Mass., to transport freight cars from the Providence and Worcester Railroad to their works—a distance of 2½ miles—and is the first one built in the United States for a similar purpose. It is nearly square, and all the machinery is below the platform between the axles, of which there are two. Its total weight is 43,000 pounds, and it is rated at 100 horse power. It was intended to build a machine that would draw two loaded cars, but the machine drew six such cars, weighing 163 tons, with great ease on a curve and up a 3 per cent. grade. It might have developed more power, but there were no more loaded cars at hand.

A GLASS manufacturer of Vienna, Austria, claims that he has produced a new substitute for glass. In an account of his invention he says: "I dissolve from four to eight parts of collodion wool in about one hundred parts by weight of ether or alcohol or acetic ether, and with this I intimately combine from two to four per cent. of castor oil or other non-resinous oil, four to ten per cent. of resin or Canadian balsam (soft rosin). The compound, when poured upon a glass plate and subjected to the drying action of a current of air of about fifty degrees Centigrade, solidifies in a comparatively short time into a transparent, glass-like sheet or plate, the thickness of which may be regulated as required. The sheet or plate so obtained has substantially the same properties as glass, as it will resist the action of salts and alkalies and of dilute acids, and, like glass, is transparent and has no smell. On the other hand, it has the advantage of being pliable or flexible and infrangible to a great degree, while its inflammability is much less than that of the collodion substitutes.

IT has recently been remarked that only very careful readers of technical literature can realize the advances already made in the manufacture of pressed steel in this country, and the statement is also made that some of the most complicated forms in this line are now produced here more successfully than in Europe. One of the latest achievements of this character, as noted, is a steel bottle intended for a cream separator—a bottle some nine-sixteeths of an inch thick, uniform throughout, of eighty pounds weight, and having only one opening, that at the top. It is made from a plain sheet, by several operations, and finally moulded to the desired shape. It is stated that this construction, simple as it is, is a veritable boon to dairymen, as former bottles for this purpose, made of castings of steel and malleable iron, did not possess the requisite degree of safety when revolving at the rate of 7,000 revolutions a minute. Sweden is said to be the only other place where these bottles are manufactured.—*Industrial World.*

A QUEER submarine boat, for which the inventor claims some wonderful things yet to be attempted, has been launched at the Detroit Boat Works. It is the invention of George C. Baker, of Chicago. The propellers are reversible and placed amidships. They are intended to regulate the immersion of the boat and propel it. The craft is 40 feet in length, 9 feet in width and 14 feet in depth. It is elliptical in shape, and it draws eight feet of water. A cover of prepared canvas is stretched over the oak frames, and that is covered with one-inch plank. The boat will withstand a pressure of eighty-six feet of water. Air is stowed at a pressure of fifteen pounds, and sufficient can be stored to last three men for several hours while the boat is submerged. An observing tower two feet in height is on top of the boat.

HERE are some points of interest about forging and welding by electricity: The outer part of a piece of iron, when heated in a forge, is at a white heat while the inner part is comparatively cool, and it cools so rapidly that several heatings may be necessary before it can be forged. In forging by electricity, the slow alternating currents heat the inner part first, and the heating is so rapid that the part that is in the path of the current is heated to any extent the ends being hardly warm. A workman can handle a bar of iron a foot in length that has six inches red hot. The heating apparatus has bronze clamps, with electrodes, that hold the piece to be heated. A bar of iron can be heated to a white heat in a few seconds. A steel wire can be twisted in a spiral at one heat. A square bar of iron can be heated evenly throughout its length, worked into different shapes on an anvil, and straightened again at one heat. In welding by electricity, the two pieces are brought end to end, and the imperfect contact causing resistance, the ends become heated and are then pressed together.

## THE BERLINER PATENT CASE.

THE issue by the Patent Office of what is known as the "Berliner patent" for a telephonic transmitter has made evident to the public what has long been known to every sharp patent lawyer and inventor, that there are ways of making the actual life of an invention and practically the life of a patent, a good many more years than the seventeen provided for by law.

In the first place, an inventor has two years after the date of his invention in which to make application for his patent. This two years can be almost indefinitely extended if he can show that his delay has been for the purpose of perfecting his invention. During all of this time, be it two years or twenty, he can use the invention himself provided it is not introduced into general use.

When it gets into the patent office, that is, after the application for an invention is filed, the grants of the patent can be prolonged indefinitely, as this Berliner case has been, by methods that are well known, such as filing claims to have them refused, making amendments that may be more or less germane and that may be rejected or allowed, all to get a record of some action on the part of the Patent Office, usually an adverse action being desired, as the inventor has two years after such adverse action on the part of the office in which to act himself and to get another adverse action, when he can delay another two years.

Under such methods, and for each of these rules or methods there are excellent arguments when they are honestly used, it is easy to see how an application can be kept alive in the Patent Office and the practical life of a patent, for during all of these years the inventor is protected, can be extended almost indefinitely. The aim of the inventor is not to get final allowance of his claim, for then the patent must go to issue in six months, but to prevent the granting of his claim.

Under these circumstances it is easy to imagine how this Berliner patent has been held in the Patent Office, especially if there was