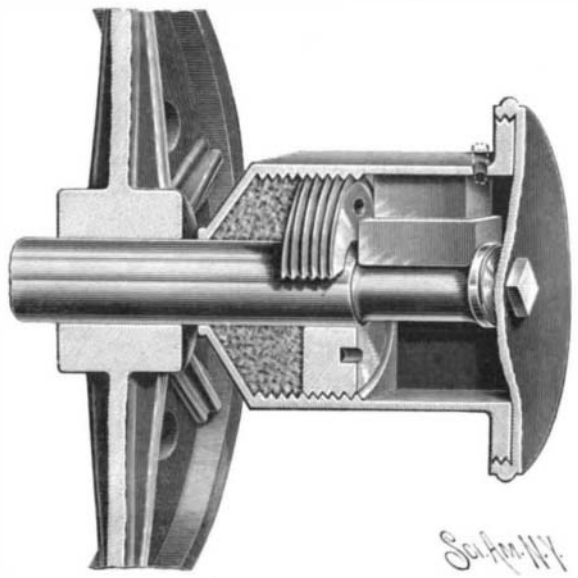
AN IMPROVED CAR AXLE BOX.

An axle box designed to absolutely prevent the entry of dirt and grit to the bearing parts, while facilitating their perfect lubrication with oil only, is shown in the accompanying illustration, and has been patented by Carolus Noyes, Jr., of Valley Falls, R. I. It has a circular, tapering inner portion, and a square outer portion, hermetically sealed by a screw cap or cover, the circular inner portion being threaded to receive a packing ring screw, which may be screwed against an oakum or other packing by a suitable tool. If convenient to facilitate the use of a packing ring of any desired shape, the thread may be dispensed with and



NOYES' CAR AXLE BOX.

the packing ring held in position and pressure given to it by extending rods from the ring to a similar ring resting against the cover of the box, when the screwing of the cover into position would give the same results. In the square portion of the box, on the neck of the axle, are two bearing blocks or brasses, the weight of the car coming upon the box directly over the blocks, and in the top of the box, at its outer end, is an opening for the introduction of the lubricant, which should be allowed to rise to a point above the concave bottom of the lower block, thus completely submerging the axle.

ELECTRIC FERRY BOATS.—Eight small electric ferry boats were put into service some time ago at Bergen, Norway, to replace the old inadequate rowboat system, and afford interesting evidence of the growing appreciations of electric motor possibilities. The boats are about 16 feet long, of 6½ feet beam, and 2½ feet draught, and have a displacement of about 6 tons. They are built symmetrically fore and aft, and are provided with a screw and rudder at each end. The screws are on a common shaft, direct coupled to the motor, which is series wound, weighs about 600 pounds, and is rated at three horse power. It is placed in the middle of the boat, under the flooring. The storage batteries are placed partly under the flooring and partly under the seats. The plates of each battery weigh about 3,000 pounds, and have a capacity of about 20,000 watt hours. The battery itself consists of 32 cells in series, and weighs altogether about 5,280 pounds. The average speed, with a power of 2,300 watts, is about five miles an hour. Each boat runs about 37½ miles a day, and about 1,800 passengers, on the average, have been carried by the ferry each day. After the day's work is over the boats return to the charging station, where the accumulators are charged during the night, and the necessary cleaning is done and repairs made. The charging station is fitted with a compound portable steam engine, a dynamo of 30 horse power, and a suitable switchboard. During eight months' run of uninterrupted operation the plant is said to have proved excellent in every respect.—Marine Record.

THE INGERSOLL CYCLOMETER.

In old days the wheelman was willing to pay a very high price for a cyclometer, a necessity which no longer exists. We have prepared the accompanying illustration with a view to showing our readers one of the newest forms of cyclometers. It is made partly of aluminum, the wheels and dial being of that metal. It is attached by a clip to the fork side, so that the front wheel axle nut need not be disturbed, this being no slight improvement over the usual method of attachment. The striking pin also possesses a peculiar feature. It is a cylindrical pin ending in a split screw which straddles one of the spokes, and it is secured and adjusted for protection by two nuts, one on each side of the spoke. To prevent the pin from swiveling, a tongue is used which, inserted between the nearest spokes, prevents the possibility of its swinging around the spoke to which it is attached. The adjustability of the pin for length is a very great improvement, as wheels differ in proportion so greatly. The Ingersoll cyclometer registers up to 10,000 miles and is provided with a hand which, going one circuit of the dial for a mile, gives readings to 1-100 of a mile. The weight is 1¾ ounces. It is manufactured by Robert H. Ingersoll & Brother, 65 Cortlandt Street, New York City.

AN ELECTRIC WELDING MACHINE FOR USE ON BICYCLE FRAMES AND SIMILAR WORK.

We have from time to time published articles upon various systems of electric welding, especially when such work has been done in welding railroad rails. In the accompanying illustrations, for which we are indebted to London Engineering, we show apparatus adapted for use in smaller work, such as welding bicycle frames, steel pipes, etc. Our contemporary says:

This system is now being introduced by Mr. T. Scott Anderson, of the Royal Insurance Buildings, Sheffield. It is known as the Zerener system, and is founded on the well known phenomenon of the deflection of the electric arc by a magnet. The mutual action of an electric current and a magnet is, of course, the basis of dynamos, galvanometers, and of most forms of electric instruments, but the effect is nowhere so strikingly shown as when a powerful electromagnet is placed beside an arc playing between two carbon points. The arc is then driven outward until it resembles a blowpipe flame, and can be used as such, but with this difference, that the temperature is enormously higher. It will be readily imagined that with this flame some very difficult jobs in soldering, brazing, and welding can be attacked with much better prospects of success than if any other means are employed.

There are two forms of apparatus for applying the deflected arc, according to the size and power of the flame required. Fig. 1 shows the smaller form. The current passes from carbon to carbon, forming the arc, and the feed is arranged by means of a small thumb-spring. By means of the horseshoe electromagnet, the position of which is adjustable, the arc is deflected at will to any position, and the heat is thus spread over

THE INGERSOLL CYCLOMETER.

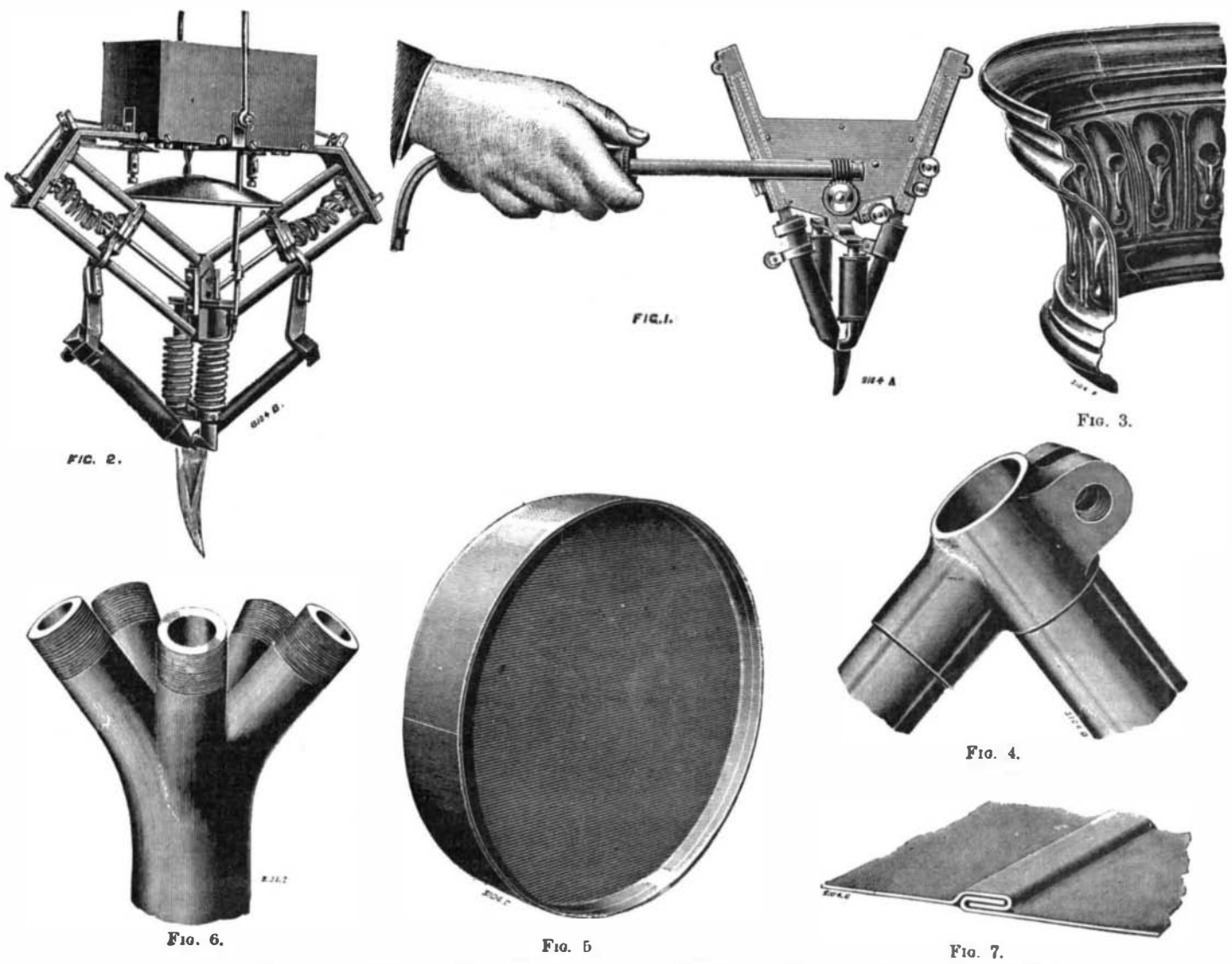
any desired area. One of the smallest of these plants, operated by one workman, and driven by a 5 indicated horse power engine, has made 2,000 brazes in a week of 54 hours, and Figs. 3 and 4 show specimens of the work thus done. Tubes of brass, copper, aluminum, steel, and iron have been thus brazed as brass to brass, copper to copper, or as copper to steel, brass to iron, etc.

A large number of trials have been successfully carried out to meet the requirements of the cycle trade, and two complete plants for this work are already in use. Fig. 4 shows a part of a bicycle frame.

In large work, the automatic apparatus is used (Fig. 2); the principle is precisely the same, but here an automatic arrangement is employed for feeding the carbons, and instead of the apparatus being held by the workman, it is suspended or placed in any position required. A considerable amount of work has been done by this large plant, which varies from 150 to 300 amperes output. Steel pipes from ⅛ inch to ½ inch thick have been longitudinally welded, the rate of work comparing favorably with the present system of riveting. Deck plates up to ⅝ inch thick have been satisfactorily welded, and a plant for this particular work, and also the ordinary requirements of a shipyard, is being erected.

Seam welding is probably the finest production of the deflected arc system; we have before us a sample weld in a plate $\frac{1}{16}$ inch thick, 34 inches long, and 8 inches wide, seam welded from top to bottom.

Fig. 5 shows the bottom brazed into a steel barrel. The joint, however, can be equally well welded with a slightly larger expenditure of current. These barrels are welded throughout, ends, longitud-



AN ELECTRIC WELDING MACHINE FOR USE ON BICYCLE FRAMES AND SIMILAR WORK.