A Decision in the Sprague Motor Case.

After having been considered and passed upon by nearly every United States judge in this district, including those comprising the United States Circuit Court of Appeals, the suit of the Sprague Electric Railway and Motor Company against the Union Railroad Company and the Walker Company would appear to have at last been finally settled by a decree rendered by United States Judge Wheeler, in which the Court of Appeals concurs, unless the defendants decide to carry the litigation to the United States Supreme Court.

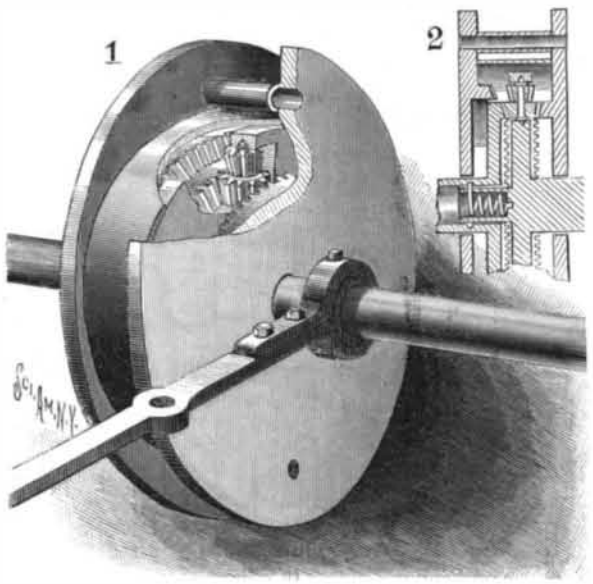
Judge Wheeler decides that the plaintiff is the owner of the patent for an electric railway motor, the original inventor of which was Frank J. Sprague, and orders that the defendants be perpetually enjoined from making, using or selling the device. His Honor also directs that the defendants pay to the plaintiff all profits which they may have derived from the infringement and use of the Sprague patent. Commissioner Shields is designated as master to take an account of such profits and to report to the court.

This decision involves many thousands of dollars and the payment of royalties to the Electric Railway and Motor Company by railway companies throughout the country that are using the Sprague trolley device.

AN IMPROVED DIFFERENTIAL GEARING.

The gearing represented in the engraving comprises two shafts rotating independently of each other and yieldingly connected by a coiled spring held in the reduced hollow end of one of the shafts. The shaft carrying the coiled spring is provided with a disk upon which axes are mounted carrying pinions. Upon the other shaft a gear-wheel is mounted. Of the pinions carried by the disk, the lower ones are always in mesh with the gear-wheel on the shaft, but may be moved in or out of engagement with a fixed gear-wheel held in the frame of the apparatus opposite to the shaft gear-wheel. The other or upper pinions can be made to engage a larger gear-wheel also fixed to the frame, but arranged on the same side as the gear-wheel mounted on the shaft. The two fixed gear-wheels are adapted to engage the pinions alternately.

Upon rotating the gear-wheel shaft, the pinions are made to revolve. When the lower pinions are in mesh with the smaller fixed gear-wheel, as shown in the section, they roll off on this fixed gear-wheel, and, therefore, the disk carrying the pinions is made to revolve on the shaft on which it is formed. When, by shifting the disk shaft, the upper pinions are made to mesh with the larger fixed gear-wheel, then an opposite motion and different speed are imparted to the disk shaft, as the upper pinions roll off on the larger fixed gear-wheel. If, on the contrary, the disk shaft be rotated, then the disk carries its pinions around and they then roll off on either of the fixed gear-wheels and, consequently, cause the shaft gear-wheel to rotate the shaft upon which it is mounted.



FYFE'S DIFFERENTIAL GEARING.

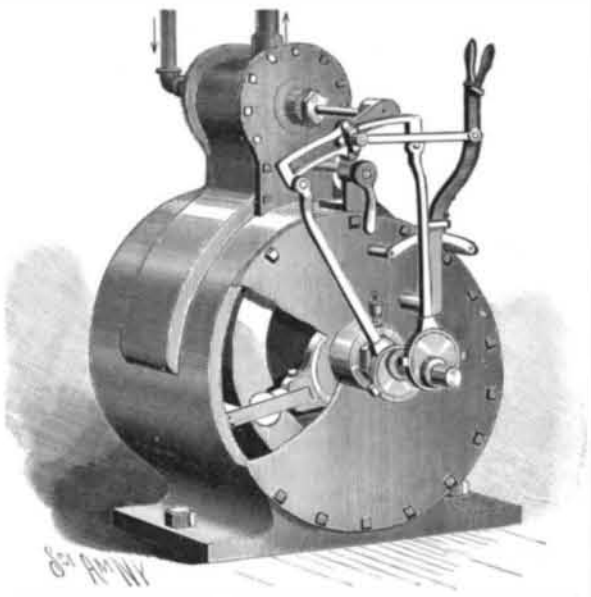
When it is desired to change the pinions, the coiled spring in the reduced end of the disk shaft is made to yield longitudinally, so as to permit both shafts to be moved closer together or farther apart, depending upon the size of the new pinions.

The gearing is the invention of Daniel Fyfe, of Covington, Tenn.

MORE or less aluminum is now utilized in the manufacture of scales, especially in the more delicate machines. Many makers use aluminum for beams, pans, riders, bars, levels and bows, in making their fine balances and weights. By using aluminum, greater delicacy can be attained in weighing than when the scales are made of heavier metals, while it is easier to make levels of aluminum, for the metal can be more readily spun around the glass of the spirit level than brass.

A NEW ROTARY ENGINE.

The rotary engine illustrated by the accompanying engraving comprises a cylinder in which a power shaft is eccentrically mounted. The wall of the cylinder has exhaust ports leading from its central portion and communicating with an exhaust port in the head on the cylinder. Inlet ports are also provided which conduct steam from the head to the interior of the cylinder. The head has a steam port designed to communicate with a hollow cut-off valve mounted to oscillate in the head and having an open end into which the live steam may enter. A piston disk is mounted on the shaft eccentric to the cylinder, so that its upper portion will engage the upper portion of the interior of the cylinder, thus providing an abutment for the steam. Piston wings are movable in oppositely extended openings of the piston disk and the opposite ends of their inner portions are provided with segmental straps engaging with rings secured to the cylinder eccentrically to the shaft. Rocking-blocks oscillate in concave recesses at the outer ends of the openings in the piston disk, and between these rocking-blocks the wings slide as the piston rotates. A lever on the exterior controls a reversing valve in the head and may be turned into register with either of the two sets of ports, depending upon the direction in which it is desired to run the engine, thus providing a means for reversing. A simple arrangement of levers and eccentric rods connected respectively to the cut-off valve and the shaft enables the steam to be cut off at any point where it is desired that the expansion shall take place. The engine has been patented by Fred J. Macey, of Ontonagon, Michigan.



MACEY'S ROTARY ENGINE.

A COIN-CONTROLLED BICYCLE-PUMP.

A patent has been recently issued for a novel bicycle-pump, which is controlled by a coin. The pump is put in operative position by the insertion of a piece of money and thrown into inoperative position by the removal of the wheel. The device is the invention of Lewis S. Brown, of 1242 N. High Street, Columbus, O.

In this invention a frame is mounted on a stand provided with two hooks for supporting the lower portion of a bicycle wheel. A third hook is secured to a vertical support connected to the frame, and receives the upper portion of the wheel. A bicycle pump is provided which is operated by a crank-wheel mounted on the vertical support and connected to the pump-rod by means of levers and bars. This crank-wheel is turned by a larger wheel made to resemble a bicycle wheel, and provided with a handle. In the upper portion of the frame is a casing containing the pump-controlling mechanism.

In operation, the bicycle wheel is first placed in position and the tire connected to the pump. A coin being then dropped into a slot, acts upon a locking lever to release a plug-valve, which may then be turned by hand engagement of an outside lever, so as to connect the tire and the pump. A locking arm is also connected with this lever, and is moved thereby to clasp and lock the wheel in place. When this locking arm is thrown back to release the wheel after the tire has been inflated, the valve is closed and the valve-locking lever drops into place, preventing the valve from opening until another coin has been inserted.

M. GENTIL'S expedition has succeeded in working its way down the Chari River into Lake Chad, which it has explored, and in getting back to French territory, after making a treaty with the Sultan of Bagirmi.

Soldering of Aluminum.

The soldering of aluminum has always been a difficult problem, and the problem has not been, up to the present time, completely solved.

The difficulties in soldering aluminum arise from:

1st. The high heat conductivity of aluminum; and

2d. The fact that none of the ordinary soldering salts, or any easily obtainable soldering salt, will clean the surface of aluminum.

On account of the high heat conductivity of aluminum, the heat from a soldering iron is conveyed away from the iron and from the solder so rapidly that the solder does not become sufficiently liquid to flow readily. This can be overcome to a large extent by taking steps to counterbalance the spreading of the heat. If the aluminum pieces to be soldered are small and thin, then naturally the difficulty is not so great as when the aluminum pieces are heavy and absorb a large amount of heat. In this latter case the soldering iron should be kept at a higher heat than is usual and the aluminum pieces should, if possible, have been warmed beforehand.

Whereas aluminum is properly spoken of as a non-oxidizable metal, nevertheless the surface is covered with a very thin film of oxide, which prevents the solder from amalgamating with the aluminum. The most natural and simple way to remove this coating is to scrape it off with emery cloth or a file. If this is not possible, then it can be done by dipping the edges to be joined in a solution composed of about:

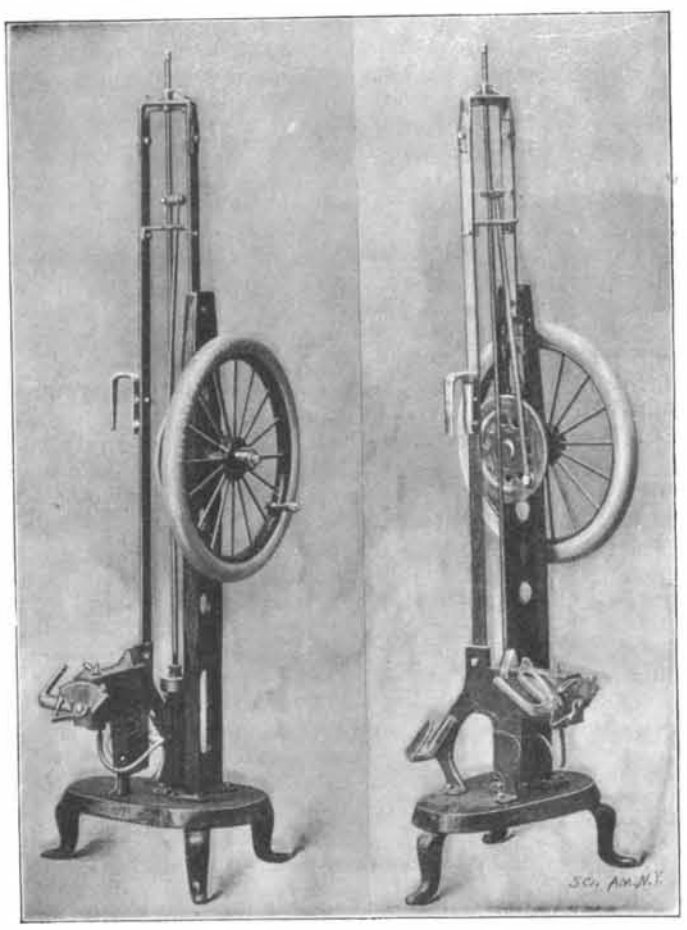
Hydrofluoric acid	1 part.
Nitric acid	10 parts.
Water	50 "

Or in a solution, first of caustic soda, and then strong sulphuric acid.

Many manufacturers, after some attempts with indifferent results, are now soldering aluminum with considerable success. Experience seems to be a very important factor in the successful accomplishment of the soldering of aluminum. A workman who perhaps is experienced in the soldering of other metals will meet with considerable difficulty in the soldering of aluminum, but these difficulties become less, and in time practically vanish, as the experience of the workman increases.

The Pittsburg Reduction Company, who have collated the above particulars, do not, however, recommend soldering, if any other means of making a joint can be employed. Soldered joints in aluminum, even when well made, are not as strong as soldered joints in other metals, and on account of the galvanic action between the solder and the aluminum, the joint will gradually disintegrate, especially if, by exposure to water or by other means, the conditions are particularly favorable for galvanic action. In dry places, however, a soldered joint will apparently last an indefinite time.

In view of the high heat conductivity of aluminum, it follows that a solder which will melt at as low a temperature as possible should be used. There are a number of solders on the market having this characteristic, or one can easily be made to suit the occasion. Nearly all aluminum solders contain a small portion of phosphor tin.



COIN-CONTROLLED TIRE-INFLATER.