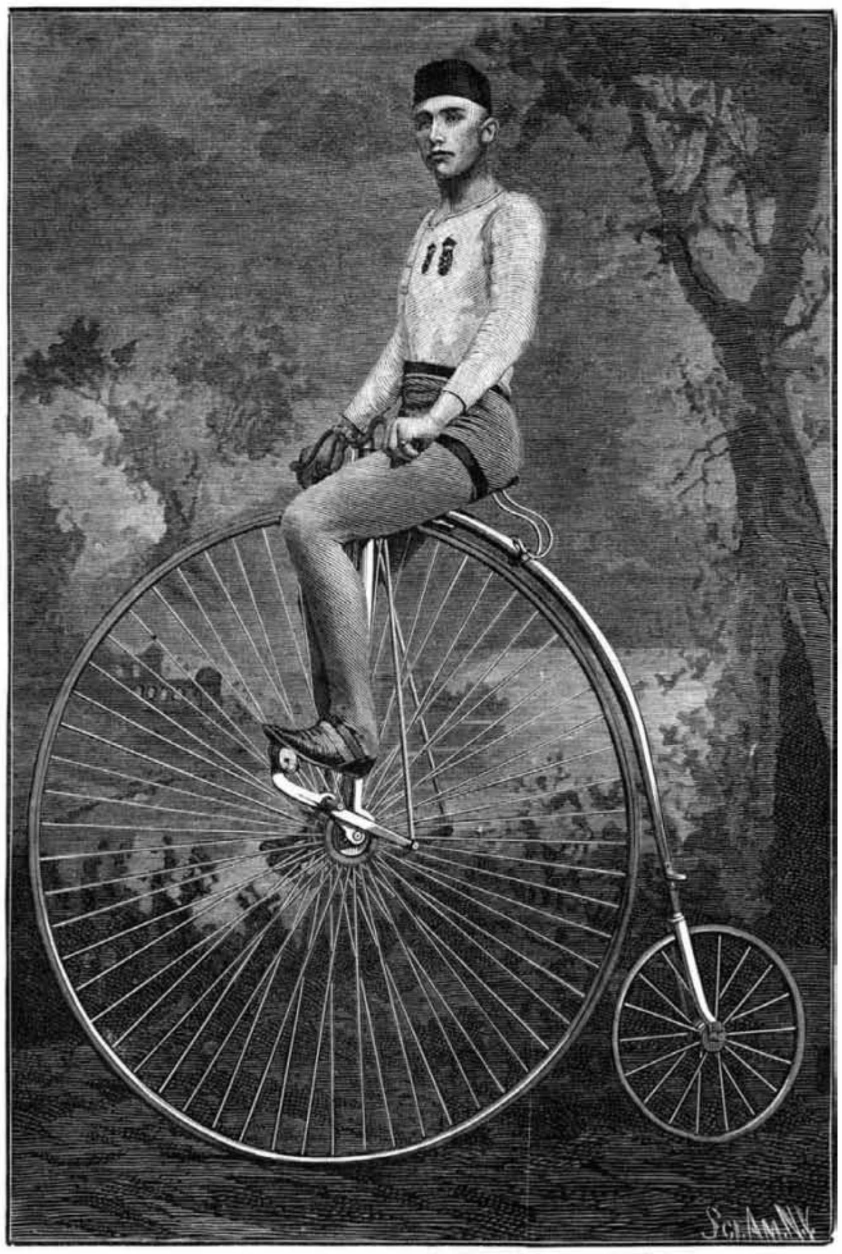
IMPROVED TREADLE FOR BICYCLES.

A novel and important improvement in treadles for bicycles and other pedomotive carriages, foot-propelled machinery, etc., is clearly shown in the accompanying engraving. The improvement consists of a short lever attached to the usual pedal pin extending several inches rearward, where it is hinged to a swinging fulcrum rod, which is hinged to the upper part of the fork, thereby allowing the lever to follow the crank motion with almost absolute freedom from friction, while at the same time it acts as a fulcrum for the lever, which, with the pedal, projects forward of the crank far enough to give a considerable advantage in leverage over the ordinary crank. The advantages of this construction are that, while adding but two pounds to the weight of the machine, it gives the rider more power in driving his wheel, and at the same time it shortens the foot motion several inches, giving a long, full down-stroke, which passes the dead center, with a comparatively short up-stroke. The crankpin can also be used as a pedal, giving a still shorter motion for down hill and easy grades, thereby avoiding the monotony of the continuous long motion of the ordinary crank. Another important feature is that by simply lowering the fulcrum rod, which can be done in two minutes, a small man can ride as large a wheel as he can climb upon.

It will be seen that the lever is so connected that at the point in the revolution where the crank possesses the greatest power, the fulcrum, axle, and crankpin are in the same line, which is at right angles, or nearly so, to the direction of the pressure, thus giving greater power than the simple crank would. Owing to the angle which the lever makes with the line of the dead centers when above and below it, that portion of the path of the crankpin during which the power is applied is greater than one-half, and the return portion, during which no work can be done, is correspondingly less; so that with two opposite cranks the working portions of the revolutions respectively overlap each other, and the dead centers are practically eliminated. By varying the relative proportions of the two ends of the lever, and the corresponding crank according to the purpose for which the machine is required, it can be adapted to obtain either increased speed, as in racing, or an increased power, as in hill climbing. According to the testimony of expert riders, these treadles are far superior to the ordinary crank, both as to speed and power. If necessary, ball bearings can be placed upon the crankpin, thereby reducing the friction to the minimum.

This treadle is the invention of Mr. Geo. J. Taylor, of Salt Lake City, Utah, who may be addressed for further particulars.



TAYLOR'S IMPROVED TREADLE FOR BICYCLES.

Waterproofing Paper.

A new composition for waterproofing paper consists of the following ingredients, combined in the proportions stated, viz.: resin, 50 per cent; paraffine, 45 per cent; silicate of soda, 5 per cent. These ingredients are thoroughly mingled by heating them together, and by agitation. The paper to which the composition is applied is usually building or sheathing paper. The latter is taken in the condition in which it comes from the paper machine, being quite dry. A strip or strips of the paper, from a roll or other convenient holder, are conducted and drawn through the tank of hot composition, whereby the paper becomes well saturated with it, and upon emerging from the tank the paper passes between suitable rolls, which press any surplus composition from it, leaving it hard and smooth.

Sometimes the proportions of resin and of paraffine are varied from 5 to 15 per cent from those stated, retaining about 5 per cent of silicate of soda. Thus the proportions of resin and paraffine may vary between 50 and 65 per cent of the former, and between 45 and 30 of the latter, making a composition by which the paper is rendered waterproof and durable when exposed to the weather, and by means of which a surface finish both smooth and hard is obtained.

The Minutes Worth Saving.

The value of time is clearly demonstrated by Dr. S. A. Allibone, in his "Dictionary of Authors," when he shows by a time table (taking days in a year 313, and working hours in a day 8) that 5 minutes lost each day is, in a year, 3 days 2 hours 5 minutes; 10 minutes is 6 days 4 hours 10 minutes; 20 minutes is 13 days and 20 minutes; 30 minutes is 19 days 4 hours 30 minutes; 60 minutes is 39 days 1 hour.

Guns Worked by Steam, Gas, and Compressed Air.

In Richardson and Watts' "Chemical Technology," we find the following:

"High pressure steam is exceedingly well adapted to the performance of this kind of work; unluckily, it would require high pressure steam of 400 atmospheres, or 5,000 pounds pressure on the round inch, to perform this duty, and as such steam could only be generated in a furnace intensely heated, it is scarcely probable that boilers will be found sufficiently strong and durable to work continuously under such pressure. If they were found to be practicable, nothing more would be necessary than to bring a steam pipe from the boiler to the breech of every gun in a fortress or a ship, and the admission of the charge of such steam into the chamber by a valve would be sufficient to discharge the missile of the 68-pounder with a speed of 1,600 feet a second.

"The well-known Mr. Perkins studied this subject carefully, but applied it somewhat differently. He found that steam of this pressure could be generated only by water nearly red hot; and instead of throwing the steam into the breech by a pipe, he threw the red hot water into the breech of his gun, allowing it when there to expand itself into steam and expend its force in giving speed to the ball.

"This expedient of Perkins is well worthy of study. It has both the defects and advantages of a gunpowder gun. The red hot water thrown into the barrel would have the fault of being too powerful at the beginning of its expansion and too weak at the end. The barrel would be filled partly with water and partly with steam; and as the water grew into steam it would lower its temperature and its pressure, so that the explosive force would fall off very much toward the end of the stroke. This is the inevitable evil of allowing the water to become vapor in the gun. When the steam is generated in a separate boiler, and freely admitted into the breech of the gun, there is reservoir enough of heat and steam to maintain the even pressure in following up the ball from the breech to the muzzle. It is the evil of charges converted into gas within the breech of the gun that their temperature and pressure are too high at starting and too low at the end. The steam gun would in this respect be the best of our projectile forces.

"Compressed air has many of the advantages and some of the defects of steam; and the frequent use of the air gun has shown its convenience as well as its efficiency. Air can be compressed into a reservoir by mechanical force, just as steam can be raised in a boiler by heat; and by compressing 400 times the natural quantity of air into a given space, a pressure of 400 atmospheres might possibly be obtained in this way. If an air pipe communicated from this reservoir to the breech of our gun, air of 400 atmospheres pressure would certainly be able to follow up the 68-pounder shot, with pressure and velocity able to discharge it with a speed of 1,600 feet per second, and, therefore, to do our work; but the apparatus would be full of mechanical difficulties.

"Liquid gases are known to be receptacles of enormous mechanical power. Carbonic acid gas, liquefied and shut up in a reservoir, generates large volumes of gas with great rapidity the moment it is permitted to expand. Other gases expand with still greater rapidity and force; and if we could conceive liquid gases to be easily made, safely carried, and comfortably handled, a charge of liquid gas bottled up in the breech of a gun would be a very effectual propelling power, and quite able to generate the force we want, and to apply it within the time we require. This system, however, is also beset with mechanical difficulties.

"The preceding illustrations of steam, compressed air, and liquid gases lead us on very instructively to the manner in which fire has become necessary to do the work of a gun. A supply of heat is essential to the expansion of a gas, and a rapid supply is indispensable to the rapid performance of the work. In steam, the fire is not only external to the gun, but external to the boiler in which the steam is generated. In gunpowder, the fire is introduced into the inside of the gun, for the purpose of supplying the heat that is wanted to raise the gases to their elastic pressure, and to maintain them at that pressure while expanding. Red hot steam introduced into the breech of a gun rapidly cools down and loses its heat and power in expanding.

"If we could introduce fire into the breech of the gun at the same time, to maintain the heat of the steam and the water, the steam would become an admirable propelling force. Carbonic acid gas, expanding rapidly from the liquid into the gaseous state, cools down so suddenly as not only to lose its mechanical power, but to freeze into solid flakes of snow. If we could charge the breech of the gun with fire as well as with liquid gas, the fire would give it the heat it wants, prevent its congelation, and maintain its power to the end of the discharge.

"What gunpowder and guncotton do is really to provide a reservoir of gas and a fire to heat it simultaneously, and in the same chamber. In the case of gunpowder, the fire is fed with charcoal; in the case of guncotton, the fire is fed with guncotton wool—another form of carbon. In gunpowder, large quantities of carbonic acid gas are generated, possibly in the liquid state, and are heated by the internal furnace of the charge, possibly red hot. In like manner, in a guncotton charge, red hot water or steam is introduced with other gases, possibly also liquids, together with an internal furnace of flame; and thus the work is done—first, by the release of the gases themselves, and, secondly, by the continuance of the elasticity of those gases by the internal supply of heat. This is how gunpowder and guncotton really do the work of a steam gun, a carbonic acid gun, or any other kind of gas gun."

The Electrolytic Cartridge for Blasting.

The cartridge consists of a glass tube of a diameter to fit easily into the borehole, which should be small. The tube is very strong, the thickness of its walls being about equal to the diameter of the bore. Two wires are fused into this tube, which is hermetically closed after being nearly filled with water rendered conductive with a little acid or some metallic salt. When this cartridge has been inserted into the borehole, and the latter tamped or stemmed in the usual way, its projecting wires are connected with cables serving as "leads" from a source of electricity. All being ready, the current is put on, and the current from the generator passes between the ends of the wires within the glass tube, and decomposes the water, oxygen being liberated at one pole and hydrogen at the other. This explosive mixture continues to accumulate as the decomposing action of the current goes on. It is to withstand the increasing pressure of these gases that the thick glass is required. So long as the ends of the wires are covered by the liquid, no spark can be produced to ignite the gaseous mixture; but when these—or one of them—are laid bare by the conversion of the water into gas, the current has to pass through the latter, which is then fired. The resulting explosion is extremely violent—more violent than that of nitroglycerine even.