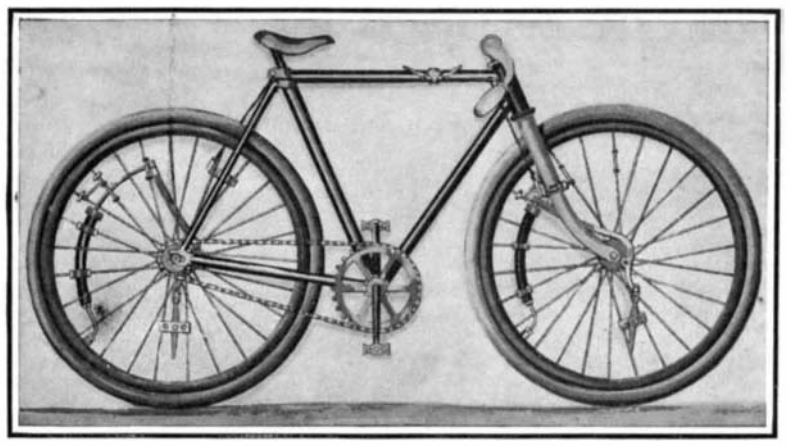
AN AUTOMATIC BICYCLE PUMP.

In the accompanying engraving we illustrate a novel bicycle pump, which is designed to be attached directly to the bicycle wheel, and which will operate automatically to inflate the pneumatic tire of the wheel as the wheel rotates. The controlling levers which set the pumps in action are conveniently located on the upper cross-bar of the bicycle frame, so that the rider may readily set in action either the pump on the front wheel or that on the rear wheel, or both, as desired. The pumps are not of ordinary form, but are curved as indicated in the illustration, so as to lie parallel with the rims of the wheels, to the spokes of which they are attached. Flexible tubes connect the pumps with the inflating nipples of the tires. The curved piston rod of each pump is provided at its outer end with a crosshead to which a lever is attached. This lever is fulcrumed to the hub of the wheel, and at its opposite end carries a pin which engages a slot in the head of a short trip lever. The latter is pivoted on a clip attached to the spokes of the wheel. Each pump is operated by an arm pivoted to the forks of its respective wheel. This arm lies in the path of the crosshead on the piston rod, so that as the wheel rotates, the piston is forced into the pump cylinder. Fastened to the spokes just above the pump cylinder is an inclined metal plate which, when the piston has been forced home, engages the operating arm and lifts it clear of the crosshead. As the wheel continues to revolve, the operating arm engages the trip lever, drawing the piston out again. This action continues as long as the operating arm lies in the path of the lever and crosshead. Normally, the operating arm is lifted, against the action of a spring, by the controlling lever, to which it is connected by means of a wire. Mr. Patrick J. McGinn, of Salisbury P. O., Rhodesia, South Africa, is the inventor of this improved bicycle pump.

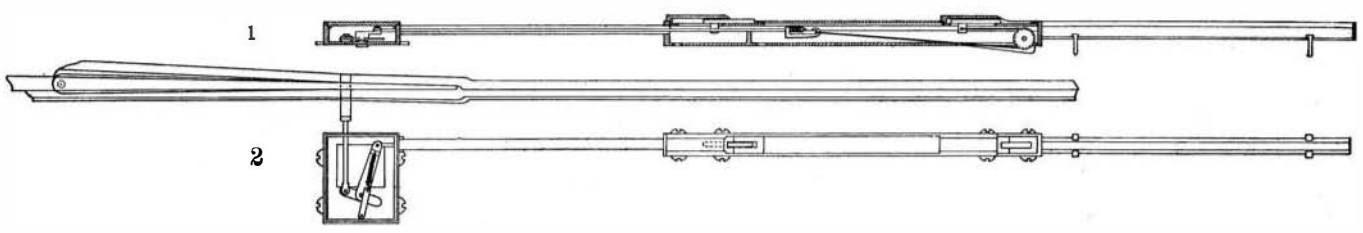
Though we have shown this pump applied to a bicycle, it is obvious that it could be used, as well, on an automobile or any other vehicle equipped with pneumatic tires.



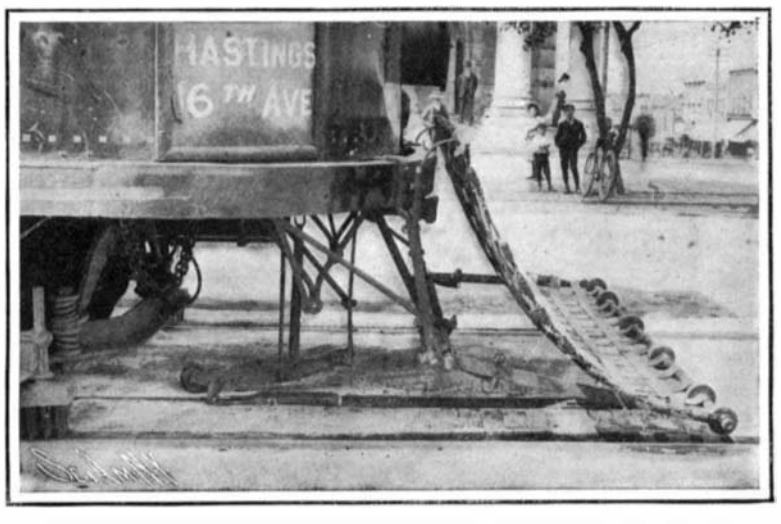
AN AUTOMATIC BICYCLE PUMP.

AUTOMATIC SWITCH THROWER FOR STREET RAILWAYS.

Our present methods of tending switches of street railways are very primitive. At busy junctions a man is posted to operate the switches, but at all other points the motorman must bring his car to a stop and throw the switch himself. Inventors have long been endeavoring to remedy these conditions by devising some simple mechanism for automatically controlling street railway switches. In many cases these efforts have failed, owing to the fact that the mechanisms were too expensive or complicated, or because they offered treacherous obstructions to the ordinary travel of the street. In the accompanying engraving we illustrate one of the successful inventions which has overcome these objectionable features and has proved its value in practice. This automatic switch thrower has been used for two years on the systems of the British Columbia Electric Railway Company in Vancouver, Victoria, and New Westminster, giving entire satisfaction. The operation of the switch is clearly shown in the detail views, of which one is a side elevation of the switch thrower with the casing partly broken away, and the other is a plan view of the same. Fitted to the switch tongue is a dog, which is connected by a rod to an angle lever. The latter is protected by a cast-iron box, within which it is fulcrumed. A wrought-iron pipe connects this box with a long cast-iron casing in which the triggers are mounted to slide. Within the cast-iron pipe is a connecting rod attached at one end to the angle lever and near the opposite end to the forward trigger. The rear trigger is connected to a rod by means of a chain, which passes over a pulley at the rear of the trigger casing. By this arrangement, it will be evident that when the rear trigger is pushed forward the connecting rod will be drawn back, throwing the switch tongue to the right, while if the other trigger is operated the rod will be pushed forward, throwing the switch to the left. The triggers are mere blocks of metal, which project above the face of the trigger casing. They are operated by means of a lever fulcrumed below the front platform of the car. The rear end of the lever is provided with a lug adapted to engage the triggers, and a roller adapted to hold the lug at proper level to strike the triggers. A short rail is spiked down, just back of the trigger casing, for the roller to travel on. A spring holds the lever normally clear of the triggers, but the motorman can at any time lower the lever by depressing a push-bar with his foot. When in this position the lug will strike the trigger, pushing it forward into a hood which is formed on the casing, and the lug, in the meantime, will ride up the inclined side walls of the hood, and thus pass on over the trigger. In use, when it is desired to close the switch for the main line, the motorman depresses the push-bar just as the first trigger disappears under the fender, and holds it down until he sees that the switch is thrown. To throw for a branch line the push-bar is depressed as the forward trigger disappears under the fender. It is not necessary to stop the car when operating the switch, though the speed should be reduced to about two miles an hour.



DETAIL VIEWS OF THE AUTOMATIC SWITCH THROWER.



POSITION OF THE SWITCH THROWER AS IT IS OPERATED BY THE MOTORMAN ON THE CAR.

A New Road-paving Material.

Great interest is being manifested among British surveyors and municipal authorities in a new road-making material called "tarmac." As the name signifies, this process comprises the utilization of a tar and macadam. The raw material consists of ironstone slag rejections, hitherto a practically wasted product, immersed in tar. The refuse is used immediately upon its withdrawal from the furnaces in a white-hot condition. It is allowed to cool somewhat, and is then broken to a requisite gage, varying according to whether it is for bottoming or finishing purposes. After crushing, and while still hot, the slag is placed in a cylindrical mixer, where it is incorporated with a mixture of tar, creosote, and one or two other ingredients. This process insures the complete saturation of the hard, tough slag with the oils of tar. Upon withdrawal from the mixer, the material is ready for use.

In making up a road with tarmac no elaborate and expensive preparations are necessary so long as the thoroughfare possesses a solid, strong bottom. No concrete foundation, such as is essential for asphalt, is necessary. It is only required to see that the road surface is smooth and that all loose stones have been removed. If the operations are carried out during the season when the weather is uncertain it is advisable to wash the road with tar, so that no interference with the work be caused through rain. Any inequalities or holes that are present in the surface of the road are cut out, tarred and then patched with a fine grade of tarmac well rammed down with a hand rammer.

The road is first covered with a layer of coarse tarmac to a depth of about 2¼ inches in thickness, though the proportion of this layer depends to a great extent upon the strength of the road, and the extent of the traffic which passes over it. Care must be observed to see that every stone touches its neighbor, so that the layer may be homogeneous and solid. The material is then rolled down carefully with a roller of medium weight, and any shaping that is necessary to the road is carried out at this stage.

When the first layer has been thoroughly consolidated it is allowed to stand for two days. A second finishing strata of tarmac of 1½ gage is then applied and similarly rolled. The result of this operation is to fill the interstices in the surface of the first layer, and to present a level, even face to the traffic. A final thin layer of slag dust is then carefully spread over the surface, completely filling any minute interstices in the road surface, and when the superfluous dust is removed a day or two later, a road surface as smooth as asphalt results.

The road by this treatment is provided with a solid coating about 3½ inches in thickness, absolutely watertight, since no water can possibly percolate through, owing to the method of construction, to the foundations beneath. Nor can the road surface be disintegrated either by the sucking action of automobile pneumatic tires, heavy wheels, or animal traffic. Another conspicuous advantage is that the roadway never becomes dusty or muddy according to the nature of the weather, as inevitably results with ordinary macadam, nor does the surface become slippery during rain, as is the case with asphalt and wood pavings. Furthermore, the expense of cleansing and sweeping is appreciably reduced, and, owing to the nature of the material, it is very durable, requires scarcely any attention, and when once laid will last for years.

Tarmac is considerably cheaper than granite macadam, and, unlike tarred granite and similar road metaling materials, as it wears it always presents a gripping surface. Owing to the fact that the heated slag during manufacture absorbs a large proportion of the tar and other mixing ingredients the life of the material is greatly enhanced.

A stretch of road in a London suburb has been treated with this material for a distance of 1,950 feet by 22 feet 6 inches wide. This highway is subjected to heavy traffic, and although the roadway was paved over eighteen months ago, no signs of wear are yet observable. The cost of treating this section was about $2,125 as compared with $1,480 for making it up with granite.

The difference in the initial expenditure, however, has been more than counterbalanced by the greater economy effected in the question of maintenance. Any ordinary macadam roadway in dry weather requires constant watering to alleviate the dust nuisance. On the other hand, the tarmac road did not require watering for three months. With the latter road cleansing and sweeping was greatly facilitated and expedited. Consequently, when considered from all points of view, the tarmac road has proved considerably cheaper in the long run, and whereas the granite macadam requires remaking every three years, the tarmac road will last at least six years. With regard to ease and comfort in traveling over the two materials there is no comparison, since the tarmac roadway always affords a level, even surface.

The advantage of the tantalum lamp is its high efficiency. It takes only half the current of an ordinary carbon-filament lamp of the same voltage and candle-power; consuming at the beginning of its life about 1.7 to 1.93 watts per candle-power, as against 3.5 to 4 watts per candle power.