

Fig. 3 shows a back view of the machine shown in Fig. 2, and is in all respects similar to that of Fig. 1, except that the large machine requires additional set-screws for fixing it to the pipe.

The utility of this machine has already become generally recognized, and it is coming into general use. The Liverpool corporation has in service one of these machines that cuts pipes up to 44 inches diameter.

A NEW CAR COUPLER.

As every one at all conversant with railways or who reads the records of accidents to the railway employees, knows, a really good coupling for cars is one of the things which have been searched for ever since railways began. The great majority of accidents on railways occur in coupling and uncoupling cars, when the unfortunate brakemen have to get between and risk life and limb in this dangerous work. The devices introduced for working the couplings from the top or sides are numberless, and have hitherto proved practically useless. Then again any new system of coupling that would require to be adopted universally, is practically useless, for any altered form must not only be good in itself, but must be able to be worked with the standard kinds now in use. These points are claimed to be met and surmounted by a new device lately patented by Mr. Walsh, in his Automatic Three-fold Car Coupler. The inventor claims that its own action is by a double horizontal plane coupler, but that by an auxiliary bar it can be used with the Millar coupler which is in pretty general use on passenger cars; while both the principal and auxiliary bars contain provision for use with the common link and pin-coupling found on freight cars. Experts have declared that the Walsh coupler is well perfected in design and meets the wants of railway men. Full sized couplers are now being made which will be attached to ordinary cars and experiments tried in their practical working. These will be looked forward to as tests of the real merit of the invention, and a full report will be given in these pages.

A HOUSEHOLD GAS MACHINE.

The question of lighting country houses is an old problem, and the isolated cases where large mansions have gas-making plant of their own, just show the need for some idea by which a small house can be lighted cheaply and with very little trouble. This problem has at length been solved, apparently very satisfactorily, by what is known as Yarrington's Gas Machine. By it hydrogen gas, after being produced in the usual way from zinc and sulphuric acid, is passed through coal oil, to increase its illuminating power. This, of course, is by no means a new idea, but the trouble hitherto has been how to store the gas as it is produced, and herein lies the beauty of the new machine. Instead of constantly producing gas until the materials are exhausted, Mr. Yarrington, by one extremely simple arrangement, causes the production to cease almost simultaneously with the use of the gas. That is, as soon as the tap is turned off and the use of the gas ceases, the machine automatically re-

moves the acidulated water from contact with the zinc, and gas at once ceases being evolved. The machine remains in this inert condition until the gas is again put into use, and as soon as the tap is opened the machine re-commences making the gas. In this idea lies the whole scheme, and its simplicity and automatic character recommend it as a really practical idea. As to cost, a machine large enough for a large house costs only about \$25, so the outlay is not heavy, and the cost of producing the gas is claimed to be under 10c. per thousand. The materials used are perfectly safe, and there is no danger of explosion. The trouble is very small, indeed, and the gas can be used for either illuminating or cooking, so the machine seems as if it had come to stay.

THE PHONOGRAPH IN CANADA.

Edison's Phonograph is now being brought forward as an article of commerce instead of a mere scientific instrument, and any one willing to pay the price can obtain a machine, and as many rollers as he wants. The right of sale in Canada has been purchased by Messrs. Holland Bros. & Young, and already they have succeeded in placing several phonographs. A stock will be carried in Montreal, which will be worked as the headquarters for the Dominion.

SCIENCE IN SOAP BUBBLES.

There is scarcely anything in the world which seems more utterly outside the realm of law than a soap bubble. The delicate film, with its exquisite floating colors, its power of instantly vanishing, leaving no trace behind, hardly seems as though it could form a link in the inexorable chain of cause and effect which we call physical law.

The atmospheric pressure on a bubble six inches in diameter is over 1,500 pounds, and yet the fragile film lies safely between the opposing forces of nature—the pressure of the outer air, the spring of the inclosed cushion within it, the downward pull of gravity, the upward push of the buoyant atmosphere, and the molecular forces in film itself—so long as the bubble lasts; it is because of an exquisite adjustment of all the forces, physical and molecular, concerned in its existence.

This is, of course, the merest commonplace, and yet it is one of the commonplaces of nature, which, however well we may know them, never cease to be wonderful when they are in any degree realized. There are other laws governing films which are no less wonderful, though they are less familiarly known. A heap of bubbles blown while the pipe is dipped under the surface of soapy water, looks like a chaotic huddle of bubbles of all sizes and many shapes; but, upon careful examination, it is found that never more than three films meet at an unsupported liquid edge, and never more than four edges meet at a liquid point, and that the angles are always equal—that is, films will not meet each other at an unsupported edge or point at an angle smaller than 120° —one-third of a circle.—From "*The Laws of Films*," by *Sophie Bledsoe Herrick*, in the *Popular Science Monthly*.