SOME IMPROVED TOOLS.

It is said a good mechanic can work with poor tools. No doubt he can, but we think he will not, so long as improved tools are obtainable. Of fine tools made by L. S. Starrett, of Athol, Mass., we have selected two or three for illustration. The speed indicator shown in Fig. 1, although a very simple instrument, embodies several improvements appreciated by mechanics. The worm and worm wheel are inclosed, and the dial which is carried by the worm wheel has graduations showing every revolution. The graduations are provided with two sets of numbers, so that the speed may be read off right or left according to the direction of rotation.

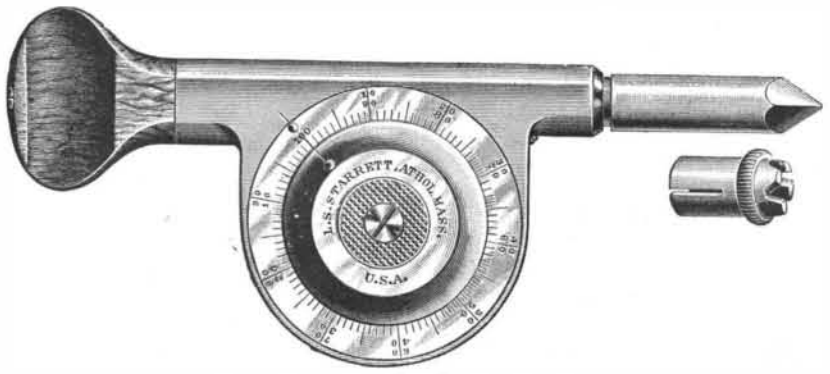


Fig. 1.—STARRETT'S SPEED INDICATOR.

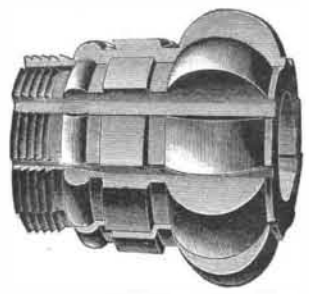


Fig. 2.—FORMED MILLING CUTTERS.

The dial is locked to a revolving stud from which it may be readily released, so that it may be returned to the zero without the necessity of turning the instrument to bring it there. A split cap is provided to adapt the instrument for use on centers or pointed shafts. The instrument has a heat insulating handle, which permits the instrument to be held in the position of use even though it should become warmed by use on high speed shafts. The dial is provided with a rounded stud which permits of counting the revolutions by the sense of touch.

Figs. 2 and 3 illustrate some of the improved milling cutters made by Mr. Starrett. Fig. 2 shows a spiral form of cutter for milling complicated shapes, and Fig. 3 represents a gang of cutters. As will be seen from these illustrations, there is practically no limit to the forms to which these cutters may be adapted.

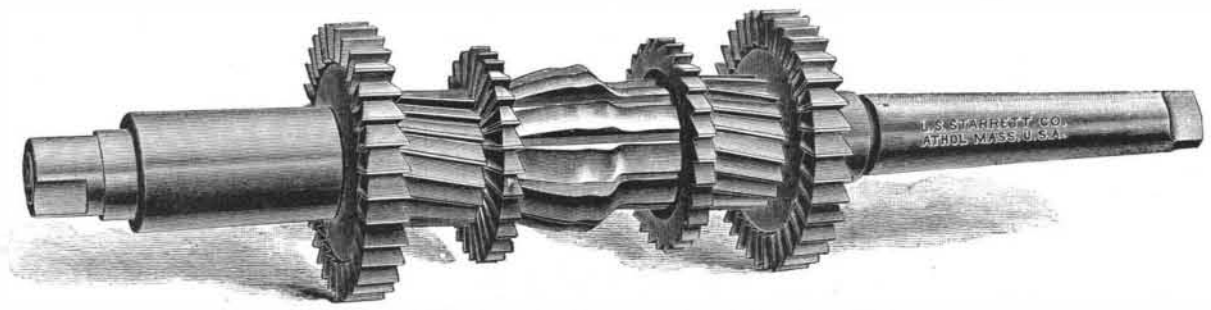


Fig. 3.—STARRETT'S GANGS OF MILLING CUTTERS.

A Sailing Bicycle.

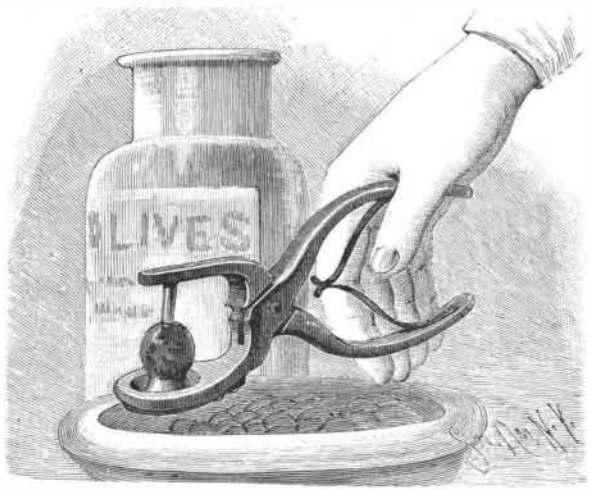
Every cyclist, says the Chicago *Evening Post*, will want to know about the invention of Charles D. White, of San Bernardino, Cal., who has recently invented a way of satisfactorily attaching a mast to the common bicycle. The principal difficulty experienced was in securing the sail firmly to the wheel. After several attempts Mr. White made a head block, in which the end of the mast was placed and secured. This block can be removed very easily by taking off the burrs on two bolts. When the sail is removed the block does not interfere with the use of the machine. The block head is made of Oregon pine, while the two side clamps are of oak half an inch thick. These are securely fastened to the wheel by two iron bolts. Great care should be exercised in placing this particular part of the attachment in position. The head block must not be fastened to the handle bars or tubing, as it will interfere with the guiding of the bicycle. It must be bolted to the joint below the elbow, as this allows the free use of the handles to direct the wheel's course. To those who will doubtless try the invention it may be explained that they should be very careful not to secure the boom to the machine, but fasten a small pulley to the spring under the seat, and allow the cord attached to the boom to run freely through it, as the balance can be kept much better in this manner. Mr. White's sail is attached to a ten foot mast and an eight foot boom, and weighs six pounds and nine ounces. The cost complete is about ten dollars, if the work is performed by the individual himself. Almost any one can make a sail and place it on the wheel. With a few hours' practice a good wheelman, Mr. White says, can easily manipulate it, and enjoy a ride without fatigue. For the benefit of those who will try the labor-saving device, Mr. White gives the following advice on the subject: "After making or buying the sail and placing it in position, keep the same furled until outside of the city, on a quiet and lonely road. Be careful when approaching a horse, as the animal will take fright when a fourth of a mile away if the sail is in position. On arriving at a secluded spot hoist the sail and allow it to swing loosely in the wind. Mount the machine the same as usual, and pedal while the wind is filling the sail, gradually, and the regular rate of speed is being acquired. Then the sail will come under perfect control. The best position is to keep one hand on the handle bars and the other on the boom, should it be close enough to the rider. When the sail swings away from the reach, control it by the cord running through the pulley under the seat. Be sure the cord will slip through the pulley easily, or a sudden squall will unseat you instantly. Keep the feet on the pedals, which should be racing or 'rat traps,' as they will hold the feet in position best. This will assist materially in keeping balance. The coasters can be used, but not so well as the first mentioned. Sailing before the wind you will go just twice as fast as in ordinary bicycle riding, while the greatest velocity is gained while riding at right angle from the wind. With good handling a speed of from twenty to thirty miles per hour can be obtained. Beating against the wind is very hard, as it is almost impossible to tack in narrow roads. No rudder is needed, which brings about a saving in resistance."

The Structure and Chemistry of the Cyanogen Flame.

Professor Smithells, of Leeds, lately read a paper on this subject before the Chemical Society, London. The association of peach blossom and cyanogen as descriptive of the color of the flame is a combination which, once learned, we never forget. The composite character of the flame is especially well seen when the cyanogen is burnt in the tube apparatus devised by Professor Smithells, where the separation of the flame into "cone" and "mantle," each burning some inches from the other, is readily effected. It was demonstrated that the colors of the flames vary according to the proportion of air that is present at the moment of combustion. With a little air the cone burns with its characteristic rosy flush, while the outer flame or mantle is blue, shading off to crimson. Excess of air causes the mantle to burn with a greenish-yellow tint, derived from the oxides of nitrogen, produced, it is believed, by the roasting the air gets, and not by its actual combustion. The gases produced by the combustion of cyanogen in air or oxygen are CO, CO_2, CN, N, and oxides of nitrogen. Considerable difficulty arises in separating and estimating these gases. For instance, the CN and CO_2 are aspirated together into a stoppered funnel containing barium hydrate, insoluble barium carbonate is precipitated, and by calculation gives the CO_2, while the cyanogen is converted into soluble cyanate and cyanide of barium, which are present in the clear filtrate from the carbonate. In addition to the apparatus for displaying the properties of the cyanogen flame itself, similar sets were provided for showing the effect of burning salts of copper, lithium, and gold. These salts were introduced by spraying solutions of the respective chlorides into the flame. The green color characteristic of the volatilization of copper appeared in the mantle. The brilliant appearance of lithium vapor is imparted to both cone and mantle, but a mixture of lithium and copper gives a meretricious effect. The copper may be seen in the upper flame, but it is often masked by the lithium, which colors the lower flame in every case, and when it masks the copper the upper flame becomes scarlet as well. A bead of sodium burnt in the cyanogen cone is completely masked, and it was shown that copper chloride, when heated in an ordinary Bunsen flame, yields three different zones of color, corresponding to metallic copper, copper oxide, and copper chloride. The source of the cyanogen is mercuric cyanide—a costly salt when gallons of the gas are needed.

A SIMPLE FRUIT STONER.

This implement for removing the stones from olives, cherries, peaches, etc., has been patented by Mr. Joseph Boeri, No. 626 Fifth Avenue (basement), New York City. On the forward end of one jaw is a male die in the shape of a pin, adapted to push the stone through the fruit, as the latter rests in a female die whose shank is attached to the other jaw. The latter die has a central opening and a sharp circular edge projecting into an opening of the jaw, the beveled wall of the opening forming an annular recess or chamber between the jaw and the die. By this means the stones may be readily removed from fruit without soiling the fingers.



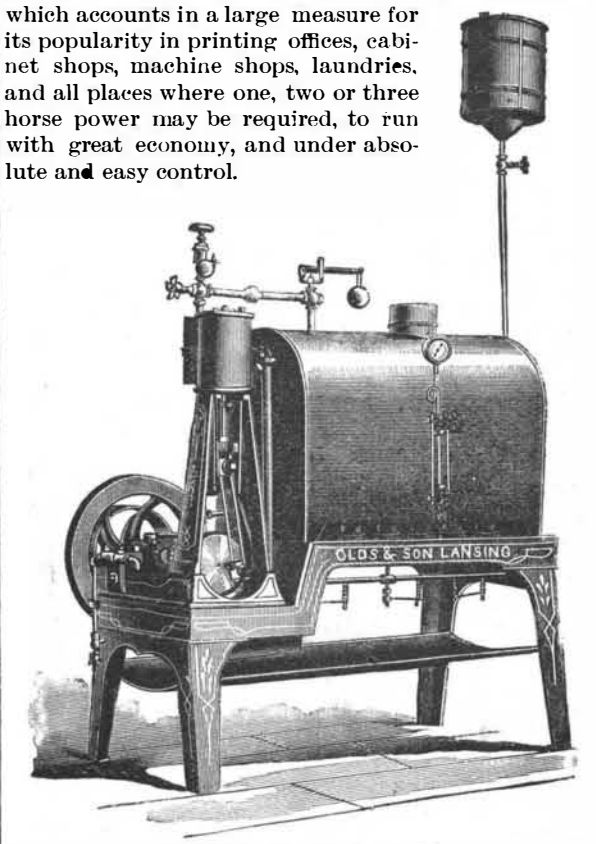
BOERI'S FRUIT STONER.

THE OLDS GASOLINE ENGINE.

The firm of P. F. Olds & Son, of Lansing, Michigan, commenced the manufacture of gasoline engines in 1885, making an engine which contained novel and ingenious improvements, covered by their own patents, and aiming to turn out as perfect an engine mechanically as the employment of the best material and workmanship would insure. The result has been that the firm has had a steadily increasing business, and a most extensive plant is now required to produce these engines, while fifty-three more engine orders were received in 1893 than in any previous year. The engine is shown in the accompanying illustration. It is automatic in its action, using steam only for a small fraction of the stroke, and allowing for full expansion, working with great economy.

All of the rods and engine shafts are of specially made condensed steel, which is also used for all the wrists and bearings, and, by improved appliances for adjusting the bearings, the wear can at any time be readily taken up, so that after many years' use the engine is designed to run as smoothly and quietly as when new.

The engine and boiler as a whole present a neat and handsome appearance. The cylinder is jacketed with polished brass, and the steam gauge, water gauge, and safety valve, etc., are of the most efficient and trustworthy patterns. Every engine is thoroughly tested and run under full load before leaving the factory. This engine requires scarcely any attention in running, and from its extreme simplicity any one can operate it, which accounts in a large measure for its popularity in printing offices, cabinet shops, machine shops, laundries, and all places where one, two or three horse power may be required, to run with great economy, and under absolute and easy control.



THE OLDS GASOLINE ENGINE.