

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

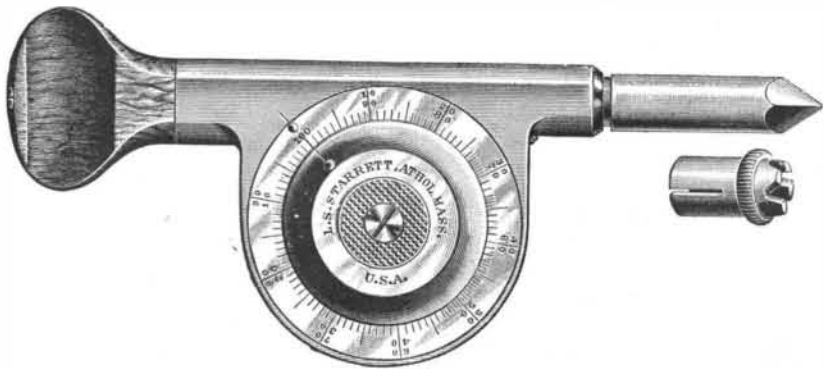


Fig. 1.—STARRETT'S SPEED INDICATOR.

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.

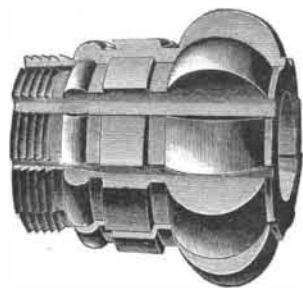


Fig. 2.—FORMED MILLING CUTTERS.

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 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

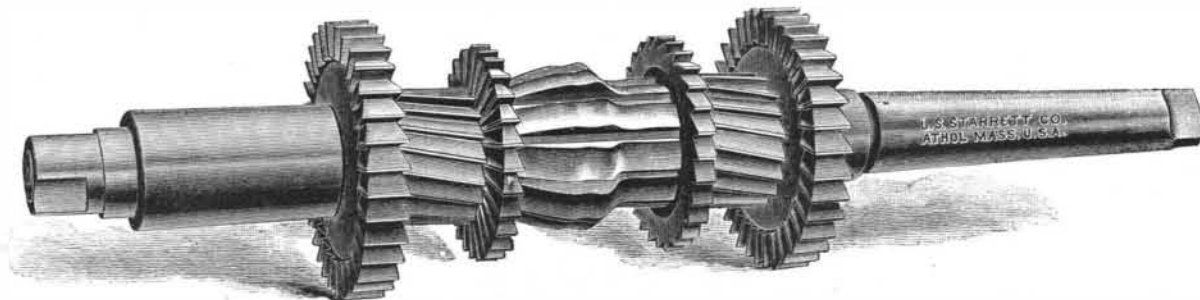


Fig. 3.—STARRETT'S GANGS OF MILLING CUTTERS.

these illustrations, there is practically no limit to the forms to which these cutters may be adapted.

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 demon-

strated 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, CO₂, CN, N, and oxides of nitrogen. Considerable difficulty arises in separating and estimating these gases. For instance, the CN and CO₂ are aspirated together into a stoppered funnel containing barium hydrate, insoluble barium carbonate is precipitated, and by calculation gives the CO₂, 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 cham-



BOERI'S FRUIT STONER.

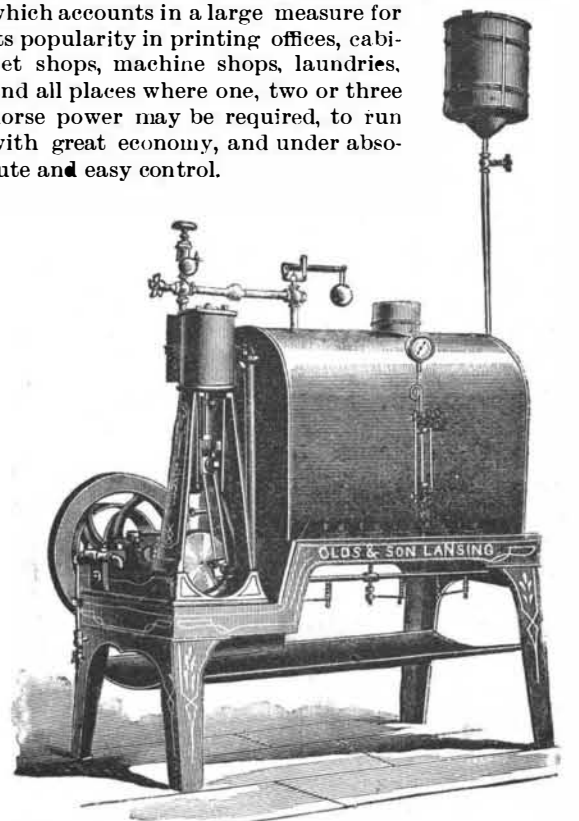
ber between the jaw and the die. By this means the stones may be readily removed from fruit without soiling the fingers.

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.

Distress Signals.

The Board of Supervising Inspectors of Steam Vessels, at its annual meeting held in Washington, D. C., January and February, 1894, recommended the following distress signals:

DISTRESS SIGNALS RECOMMENDED BY THE BOARD OF SUPERVISING INSPECTORS.

Article 31. (Prescribed by International Marine Conference, 1889.)

In the daytime—

1. A gun fired at intervals of about a minute.
2. The International Code signal of distress indicated by N. C.
3. The distant signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball.
4. Rockets or shells as prescribed below for use at night.
5. A continuous sounding with a steam whistle or any fog signal apparatus.

At night—

1. A gun fired at intervals of about a minute.
2. Flames on the vessel (as from a burning tar barrel, oil barrel, etc.)
3. Rockets or shells bursting in the air with a loud report and throwing stars of any color or description, fired one at a time at short intervals.
4. A continuous sounding with a steam whistle or any fog signal apparatus.

All officers and employes of the Life Saving Service will hereafter recognize any of these signals when seen or heard as signals of distress and immediately proceed to render all possible assistance.

Supreme Court Telegraph Decision.

A decision of importance relating to the liability of telegraph companies in sending messages has been made by the Supreme Court of the United States. The court decides that the Western Union Telegraph Company is not liable in damages to the sender of a message in cipher for errors in transmission thereof. The case came up from the Circuit Court of the United States for the Eastern District of Pennsylvania, where Frank J. Primrose sued the telegraph company for \$100,000 damages for mistakes in sending a cipher telegram from Philadelphia to Waukeeny, Kan. The message related to a transaction in wool, and the mistake, Primrose claimed, damaged him in the sum named. Judge Butler nonsuited the plaintiff in the Circuit Court on the ground that the conditions of the contract printed on the back of the telegram absolved the telegraph company from liability for errors by transmission, unless it specially insured correctness. This contract was held to be a reasonable one. Justice Gray read the opinion of the court affirming the judgment of the Circuit Court. The case has been pending in the Supreme Court since 1879.

People of ordinary intelligence not educated in the mysteries of the law will wonder why great trusts like the Western Union Telegraph Company should be exempted from responsibility for their carelessness and blunders. The Supreme Court practically holds that if you want to have your message sent correctly, you must pay double price. But if you want the telegraph company to make blunders for which you have no redress, you pay single fare.

On the same principle it would seem as if railway companies might adopt a double fare scheme, by which, unless passengers pay specially for insurance of safety, the companies will escape liability for broken limbs and other damages. All the companies need do is to print the little trick on the back of their tickets.

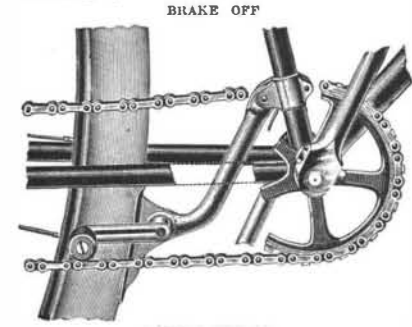
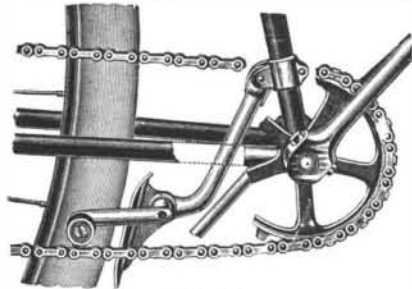
CHAIN LINKS DROP FORGED FROM BAR STEEL.

Our illustration shows three views, fully explaining the construction of an improved patented drop forged steel link recently placed on the market by the Philadelphia Drop Forge Company, No. 2350 American Street, Philadelphia, Pa. These links can be applied by hand, without the use of any tools, and being strong, light and compact, can be carried conveniently, are always ready for instant use and invaluable to users of chains of all kinds for mending, splicing and connecting same. Each link is accurately fitted, securely riveted, neatly finished and packed in boxes of one dozen of a size. The sizes now made up are 1/4 inch, 5/8 inch, 3/4 inch, 1 1/8 inch, and 1 1/2 inch, but the company expects to manufacture larger sizes as the trade may demand. As may be seen, the links are composed of two centrally pivoted halves, which are drop forged from bar steel, and whose inner faces are each provided with a lug and recess, so that when closed for use the lugs on the faces enter the recess on the opposite sides, thus bringing the parallel faces of the lugs in contact and preventing the ends of the links from spreading or being forced open. The company also makes standard and special forgings of every description from iron, steel, copper, aluminum, and other suitable metals. On application the company will

forward catalogue and price list of the Keystone open links and of their standard drop forgings, such as straight and eye-shank hoist hooks, single and double ended machine and spanner and tool post wrenches, collars or bushings, thumb screws and nuts, machine handles and eye bolts, also of standard and special bicycle forgings.

THE BAILEY AUTOMATIC BICYCLE BRAKE.

In all of the safety bicycles, when the wheel is being propelled forward, there is noticeable a slight slack in the lower reach of the chain, which is instantly taken up by the instinctive reverse pedaling



THE BAILEY BICYCLE BRAKE.

of the rider desiring to "slow down" or stop, or in descending a hill, the lower reach of the chain then becoming taut. This straightening of the lower portion of the chain effects the automatic application of the brake shown in the accompanying illustration, where one of the figures represents the brake off, another shows it applied, and the third shows the brake and its accompanying parts separate from the wheel. The improvement is a patented device of the Bailey Manufacturing Company, of No. 207 South Canal Street, Chicago; it weighs but a trifle, is not displeasing in appearance, and is designed to be in no way an inconvenience to the rider at any time. When the clamp, 1, is attached to the seat standard, the adjustable stop, 2, is set so that the roller, 6, will just clear the chain when the brake is not in use. The parts, 3, 4 and 5, are readily adjustable at any required angle, and washers are employed in setting the roller out toward the pedal or in toward the wheel. The attachment is nicely finished, durable and will fit all safeties.

Influence of Weather Upon Mind.

A writer in the January number of the *American Journal of Psychology* for this year discusses the sub-

ject from the view of common experience, and presents some facts that are interesting as well as leading in their directness. He says:

"The head of a factory employing 3,000 workmen said: 'We reckon that a disagreeable day yields about ten per cent less work than a delightful day, and we thus have to count this as a factor in our profit and loss account.' Accidents are more numerous in factories on bad days. A railroad man never proposes changes to his superior if the weather is not propitious. Fair days make men accessible and generous, and open to consider new problems favorably. Some say that opinions reached in best weather states are safest to invest on."

Other facts are mentioned in the psychological and physiological relation, as "Weather often affects logic, and many men's most syllogistic conclusions are varied by heat and cold. . . . The knee jerk seems proved to have another factor. It is not strange if the eye, e. g., which wants the normal stimulus in long, dark weather, causes other changes."

Temperament is a fundamental factor in sensitiveness to atmospheric changes, that type of it called the mental being the more intensely affected, while the bilious type may exhibit by comparison the more capricious or morbid impressions. The mental manifestations, as a rule, however, depend upon the organism primarily. If the culture is good, i. e., the faculties have been trained to co-ordinate, harmonious action, and the elements that contribute to serenity and self-control have been well developed, weather conditions will but operate like other parts of the environment, the self-training will show adaptation and self-repression. The "nervous," excitable, irascible person is he who has not learned to control feeling and expression, and it is he who finds fault with his surroundings and imputes uncanny conduct to them. That there are functional states of the body that predispose one to mental depression or exhilaration, we are ready to admit. A torpid liver, a chronic catarrh, a rheumatic joint, and even an old corn may render one susceptible to weather changes, the physical ailment producing a nerve reaction that is keenly felt at the spinal centers, and may test the spirit.

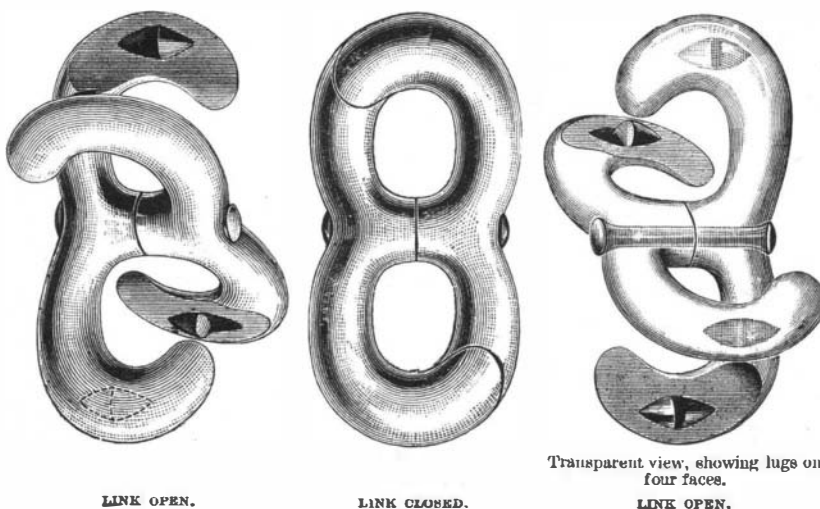
Mind, however, is superior to matter, or rather constituted for superiority. Fairly organized, carefully developed and trained, it will exhibit that superiority by its poise and calmness in circumstances that are disagreeable or painful to the physical senses.—*The Phrenological Journal*.

Jerusalem.

The British consul at Jerusalem, in his latest report, gives some interesting details respecting the state of the Holy City. It appears that buildings of various kinds continue to be erected in the vicinity, and that the city is far outgrowing its former limits. On the western side houses have increased so rapidly within the last few years that quite a large suburb has arisen where formerly there were fields and vineyards. Every available piece of land is now being bought up by private persons or by benevolent societies and missions, and already the name of "Modern Jerusalem" has been given to this new quarter. Last year the first public garden was completed outside the Jaffa Gate, and the trade is generally increasing, especially that in Jaffa oranges, olive wood work (now an important local industry), and olive oil. The export of colocynth declined in consequence of a tithe levied on it by the authorities. It is gathered by Arabs in the neighborhood of Gaza, where it grows wild. An interesting enterprise which has recently been commenced is the collection of the bitumen which rises to the surface and floats about on the Dead Sea. Two sailing boats were taken by train from Jaffa to Jerusalem, and then conveyed on carts to the Jordan, where they were floated down the river to the Dead Sea, and they are now engaged in picking up the bitumen, which is in much request in Europe. The consul thinks it would be advantageous to trade with the inland districts if a steam launch and several lighters were placed on the Dead Sea to ferry across the produce of Moab, which is a country rich in cereals, fruit, and cattle. At present it is conveyed by caravans round the north or south end of the Dead Sea, entailing a journey of from four to five days. Kerak, the chief town of Moab, is now garrisoned with Ottoman troops, and authority is established there, so that if rapid communication were established, the whole produce of Moab would find its way to Jerusalem and the coast.

Concrete Roofs.

Flat roofs have several advantages, and can conveniently be constructed of concrete, with iron or steel girders at intervals. If the under side of the concrete has to be the ceiling of the room below, it may be desirable that it should be quite flat. In this case, the necessary falls and gutters can be formed with rough concrete laid on the top of the main body of concrete. The best material for finishing such roofs externally is asphalt.



THE KEYSTONE DROP FORGED CHAIN LINKS.