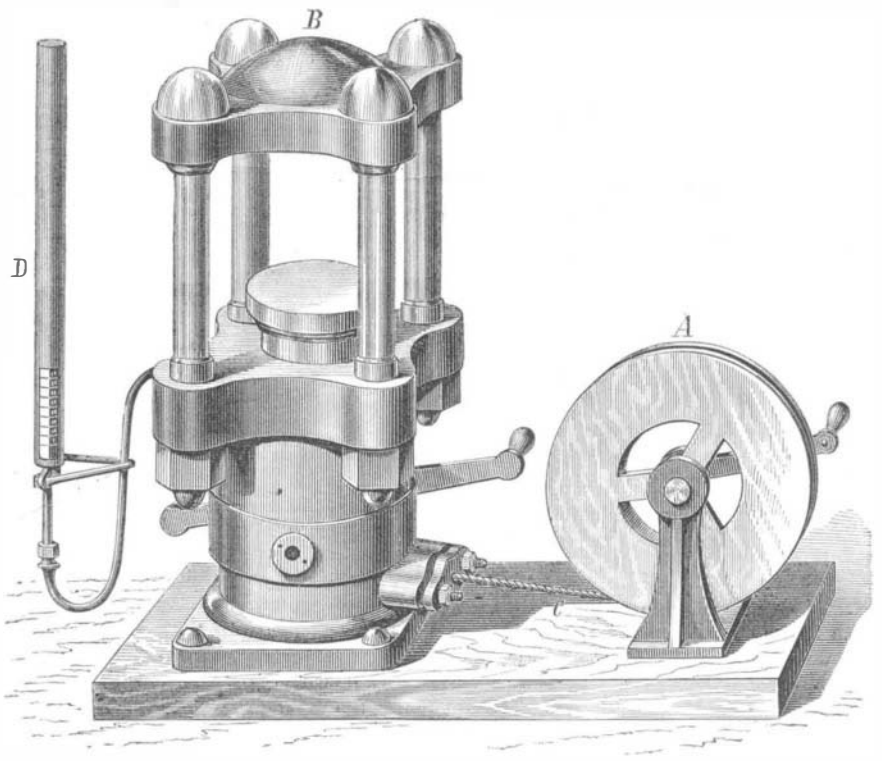
STERHYDRAULIC APPARATUS.

Barnard, in his report on the Paris Exposition, styles this the most ingenious and most decidedly original form of hydraulic press and hydraulic pressure apparatus exhibited. These presses are called by their inventors—Messrs. Desgoffe and Ollivier—their "*Appareils Sterhydrauliques.*" It is from the report alluded to that the substance of this article is extracted. If the etymology of its name does not explain the principle of the contrivance, it will be seen to be at least in harmony with it, when the principle is known. The object of the apparatus, in all its several forms, is to produce a powerful hydrostatic pressure by introducing, into the cylinder of a hydraulic press already filled with liquid, not an additional amount of liquid by successive impulses, as is the case in the common hydraulic press, but a solid substance, by a steady, unintermitted movement. Or, in the words of the inventors themselves, the *Appareils Sterhydrauliques* have for their objects—

"1. To obtain a gradual pressure, without jars, by means of a liquid hermetically enclosed in a recipient which it fills, and to do this by the forcible introduction of a solid body into the recipient.

"2. To utilize this pressure by means of one or of several pistons."

The sole difference—but it is a radical difference—between the old and the new forms of hydraulic press, consists in the manner of applying the power. In the common hydraulic press, the force exerted through the piston of a small forcing pump is intermittent, and acts by fits or jolts. But in these contrivances, the motive power is employed in introducing continuously a flexible cylinder or solid cord, by winding it on a pulley which is enclosed within the apparatus, while it is operated by a crank or a band wheel on the outside. The pressure produced is therefore gradually and uniformly raised; and it acts upon a piston moving watertight in a cylinder, as usual.



DESGOFFE & OLLIVIER'S STERHYDRAULIC APPARATUS.

The construction of a press of this kind is illustrated in our engraving. A is an external pulley on which is rolled the solid cord, B, which is represented as at the same time partially rolled on the internal pulley. This internal pulley is enclosed in a strong metallic chamber which communicates with the cylinder in which moves the large plunger, B. The driving power acts on the internal pulley, increasing the volume of the mass rolled upon it, and thus, through the confined liquid, acting upon B. By applying the power to the pulley, A, and reversing the motion, the cord may be unwound and withdrawn; thus relieving the hydraulic pressure and causing the piston, B, to reenter under the ordinary pressure of the atmosphere. Although the pressure is thus applied gently and gradually, it may nevertheless be much more rapidly raised than it is usually convenient to raise it, in the ordinary form of the pump. For, by deriving the force applied from the motor of a manufacturing establishment, the pulley may be driven with a velocity which would probably soon derange a forcing pump of corresponding capacity. The packing of the piston and of the axis of the pulley is made of raised or upset leather, as is usual in air pumps. That of the cord is simply combed hemp. The liquid in the interior of the chamber is oil, and the material of the cord is catgut. This material is easily fashioned to a uniform diameter; it takes a high polish; it is nearly incompressible and inextensible: it is unalterable in oil; and finally, its flexibility adapts it admirably to the purpose to which it is here applied. A diameter is generally given to this cord of four tenths of an inch. As to the security of the joint formed between the cord and its hempen packing, though some apprehensions were at first entertained, they have been entirely removed by experience. The hemp itself becomes after a time so compacted as to form something like a tube of horn, exactly fitting the cord. For five months a press of this description in daily use has lost nothing by leakage, nor has it been found necessary to tighten the joint.

In the construction of this press, as the chamber for the liquid is formed of a single casting, the pulley has to be introduced through the opening left for the piston. Its size being too great to allow this to be done in a single piece, it is originally formed of two equal parts, which are united on the axis.

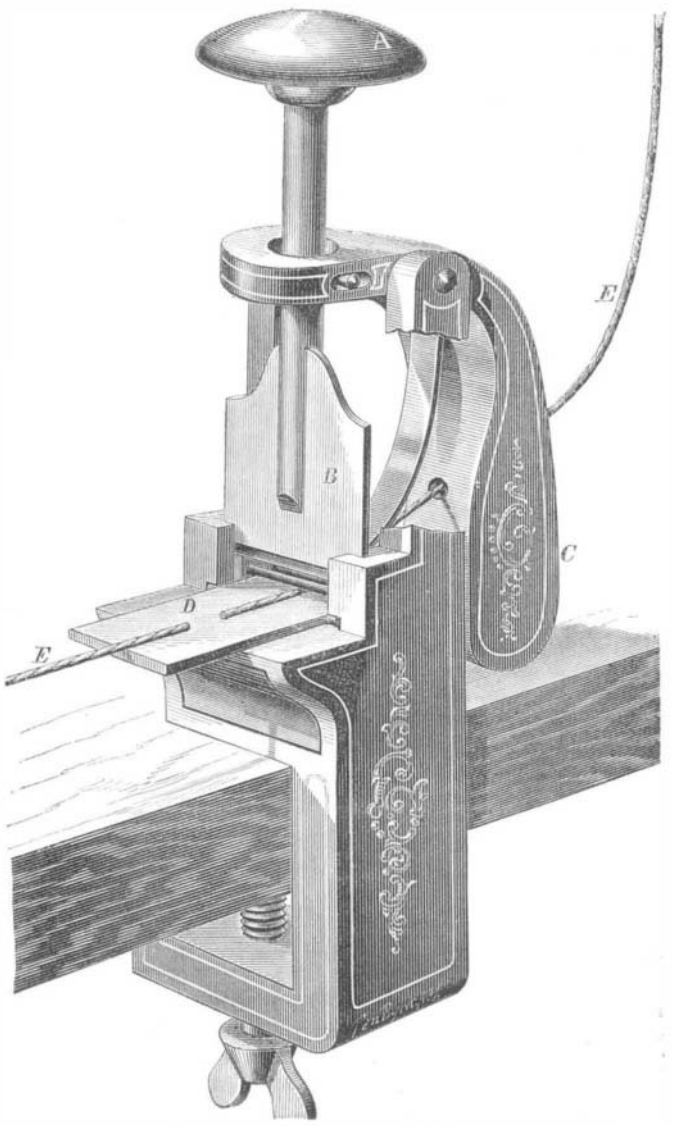
A pump of this kind has been constructed for Mr. Tresca, of the *Conservatoire des Arts et Métiers,* to be used by him in the course of his investigations on the resistance of materials of construction, and the flow of solid bodies. It received, for the convenience of these experiments, the horizontal position, and was designed to exert a force of 50,000 kilogrammes. In these investigations, the hydraulic press presented the only available means of applying the immense pressure necessary; but the intermittent and jerking action of the press, as operated by a forcing pump, had the effect of determining fracture of the masses compressed before the limit of their resisting power to dead pressure had been reached. The perfectly steady action of the sterhydraulic press completely remedied this imperfection, and eliminated the irregularities which had disturbed the exactness of the determinations.

The ordinary form of the press with vertical movement is shown in our engraving.

In this figure, a manometer, D, appears attached to the press, to serve as an indicator of the degree of compression. This is important in experiments on the resistance of materials to crushing weights.

There is one consideration which requires attention in presses constructed on this principle, when it is necessary that the piston shall have a large movement. As the quantity of cord accumulated on the pulley increases, the resistance to the driving force increases in virtue of the enlargement of the radius by which it acts. And this unfavorable effect occurs at that part of the course where the pressure on the piston is greatest; and where, accordingly, the mechanical advantage of the motive power ought rather to be increased than diminished. To provide for such cases, the inventors have devised a form of construction where the pulley is smaller but the chamber is elongated, and a second pulley is introduced at the opposite extremity; the cord being in this case rolled about both the pulleys, while much the larger part of its mass occupies the interval between them.

A case may, however, occur in which a very large piston may have to make so long a course as to render it inconvenient or practically impossible to meet the exigency by the expedients thus far described; inasmuch as the quantity of cord required for the purpose might be a troublesome encumbrance. Should, therefore, this difficulty present itself, the sterhydraulic apparatus is constructed in the form of a continuously acting pump, and is employed to introduce liquid into the cylinder of the press, as is done in the ordinary hydraulic press, only that the entrance of the liquid takes place still in a steady and uniform flow, and not by the spasmodic action which it is so desirable to avoid.



LEWIS' TWINE CUTTER.

Progress and Popular Science.

M. Sogg, of Neufchatel, writes to the editor of *Les Mondes* as follows:

"Since the world is inclined to ridicule your attempt to popularize science, permit one to sit down by your side and induce you to read what I have written on page 128, Vol. II, of my "Treatise on Chemistry," which you must have received long since. What is the science, which loses itself in the clouds of thought without a desire ever to come down to the practical, other than an error, the glory of standing by the side of those other honors which elevate the individual and debase the nation? What would astronomy be if it did not serve to measure time and to guide us on our way upon the land and the sea? To separate pure science from applied science, is to condemn each to sterility; they can no more exist alone than our heads can exist without arms and legs.

"Thénard would be forgotten if he had not found the cobalt blue which bears his name; it is alkalimetry and alcohometry which have rendered popular the name of Guy-Lussac, and, in spite of all his admirable works, the name of Chaptal would be forgotten if he had not connected it advantageously with the manufacture of beet-root sugar.

"Consider how the intelligence of most of our great men is developed, and you will find always that they step upon the scientific stage with works as brilliant as they are useless to human society; later on and gradually, experience, the daughter of age, teaches them to devote themselves to practical application, and they are more pleased with and more proud of having perfected an industrial process, found the formula of a fertilizer, or discovered a new aliment, than if they had devised one of those brilliant theories which flash across the scientific heaven, like falling stars in the space of the firmament, and leave no trace behind."

LEWIS' TWINE CUTTER.

The accompanying engraving illustrates an ingenious and extremely convenient twine cutter, for use in stores, warehouses, etc., for cutting the cords employed in tying packages.

The construction and utility of this neat device will be apparent on reference to the engraving.

A knob, A, is attached to the stem of the blade, B, the latter working vertically in guides. When the blade is struck down by the action of the hand on the knob, it raises the outer end of the lever weight, C, the connection of the stem of the blade and the lever weight being made by a pin and slot. When the hand is removed from the knob, the outer end of C drops and raises the blade again.

The part of the twine, E, to be cut, rests on a movable table, D, during the cutting, and is fed from the ball or spool through a hole in the outer part of the weight, C, thence under the end of a spring which holds it firmly down upon the table, and thence under a small wire guard just behind the knife, which holds the end of the twine from lifting, when the knife rises. The end of the twine, being thus held to the table, moves with it. The table slides back and forth, being connected to the outer end of the lever weight by a link which draws it backward, as the knife descends and the outer end of the lever weight rises, and is thrust forward again when the weight falls, carrying the twine with it so as to place the cut end in convenient position to be grasped when wanted.

In use, the twine is drawn out, wound around the package, and tied, when a slight blow upon the knob cuts it off. The hand being removed, the instrument at once resumes the position for a successive operation; in other words, it holds the twine, cuts it, and hands it back to you.

Patented through the Scientific American Patent Agency, Nov. 7, 1871, also in England, by Chas. C. Lewis, Gainesville, Ala. [See advertisement on another page.]

LIQUID POLISH.—The preparation of blacklead ready for use in a fluid state, is a recent English invention. The composition adopted consists of black lead, such as is used for polishing stoves and for other uses, combined with turpentine, water, and sugar or saccharine matter, and the proportions which have been found to answer well are, to each pound by weight of the blacklead, one gill of turpentine, one gill of water, and one ounce of sugar; but these proportions may be varied, and in some cases all the ingredients are not necessary.