TESTING LUBRICANTS.

We give, from *Engineering*, engravings of a machine employed by the Eastern Railway Company of France for ascertaining the value of various lubricants, the particular machine illustrated being one which was exhibited by the company, at Paris, last year. Referring to Fig. 1, it will be seen that the testing apparatus consists of a horizontal iron disk, A, driven at a uniform speed, and having bearing upon its upper surface three gun metal blocks, *t t t*, fitted to a second disk, B; this second disk being pressed down on that first mentioned by means of a lever, R, fitted with an adjustable weight. A small hand worked lifting arrangement, D, enables the weighted lever, R, to be raised so that the upper disk, B, can be removed, and the lubricating material to be tested spread over the surface of the disk, A.

When the arrangement just described is in operation it is evident that the disk, A, as it revolves, will tend to drag the disk, B, round with it, the rotative force thus exerted depending upon the pressure exercised upon the disk, B, and upon the nature of the lubricating material between the two rubbing surfaces By connecting the spring of a dynamometer to the periphery of the disk, B, the amount of work absorbed in friction during the time that a sample of lubricant is being used up can be ascertained, while, the duration of the experiment being duly noted and the elevation of temperature registered, the data are obtained for forming a practical estimate of the value of the lubricant under trial. The dynamometrical apparatus consists of a weight, X, slung by a band passing over a cam fixed on a horizontal spindle mounted on the frame, F, the periphery of the disk, B, being also connected to the cam just mentioned, so that as the disk, B, is dragged round by disk, A, the weight, X, is raised. Owing to the form of the cam, the weight, X, offers a constantly increasing resistance as it is lifted, and the amount by which the weight is raised is thus a measure of the force with which the disk, B, is dragged round; or, in other words, it is a measure of the friction between the disk, A, and the rubbing pieces, *t t t*. The amount by which the weight, X, is raised is registered as follows: The spindle on which the cam is fixed carries also a small pinion, S, which engages with a rack actuating the style, K, and thus gives to the latter a movement proportional to the force with which the disk, B, is dragged round. The style, K, shown to a larger scale in Fig 3, is fitted with a spindle, *a*, provided with a fork carrying the small cutting roller, *b*, and this roller, being pressed down on to a continuous band of paper, H, by the counterweights, L, marks on the paper a curve, which forms a measure of the frictional grip between the disks, A and B.

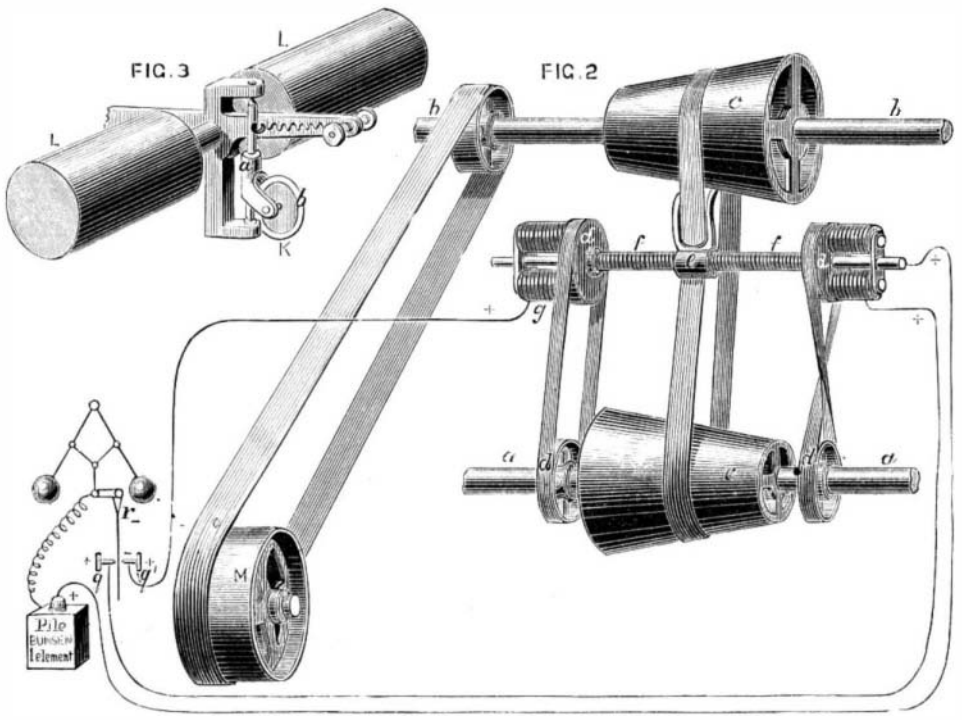
The uniform movement of the paper, H, is obtained by means of a worm mounted on the driving shaft, U, of the machine, this worm gearing into a worm wheel, V, fixed on a spindle carrying a cylinder which forces the band of paper against a second divided cylinder. This latter cylinder receives a rotative movement by gear so proportioned that the strip of paper is advanced one millimeter at each turn of the disk, A, while an inking apparatus, G, also driven by gearing, enables the millimeter divisions to be printed on the band of paper as it passes. The time of an experiment is recorded by an electric clock, I, which makes a mark upon the band of paper every half minute.

The uniform rotation of the disk, A, is secured by the use of a centrifugal governor acting through the ingenious electric arrangement explained by the diagram, Fig. 2. This arrangement acts as follows: The centrifugal governor, J (which derives its motion from the driving shaft of the apparatus), acts by means of a lever upon the spring, *r* (see Fig. 2), which oscillates between two contact points, *q q*¹, placed a very small distance apart. According as the speed of the apparatus varies above or below that corresponding to the mean position of the governor, the latter establishes a contact between the plate, *r*, and the one at the other of the contact points, *q q*¹, and by so doing causes a current to traverse the coils of the one or the other of the electro-magnets, *g g*. The arrangement of the connections will be readily understood from Fig. 2, from which it will be seen that the positive pole of a single cell Bunsen battery is connected to a shaft, *f*, on which the two electro-magnets are mounted, one end of the coils of each magnet being also connected to this shaft. The other, or negative, pole of the battery is connected to the spring, *r*, and according as the governor rises or falls it is thus brought into connection with the contact points, *q* and *q*¹, respectively. These points are, in their turn, connected by wires, one to each electro-magnet, the contact point, *q*¹, being connected to the left hand and *q* to the right hand electro-magnet in Fig. 2. Thus, if the governor rises, a current is made to traverse the coils of the right hand electro-magnet; or *vice versa*, if the governor falls, the left hand magnet is brought into operation The shaft, *f*, on which are mounted two electro-magnets, also carries two loose pulleys, *d*¹ *d*¹, which are driven by belts from the pulleys, *d d*, on the main driving shaft of the apparatus, one of the belts being crossed and the other open, so that the loose pulleys, *d*¹ *d*¹, are driven in opposite directions. On the central part of the shaft, *f*, a screw is cut, and a nut, *e*, fitted to this screw carries a fork acting on the belt connecting the two pulleys, *c c*. The upper of these conical pulleys is fixed on a shaft, which carries also a pulley from which a belt is led off to the fast and loose pulleys, M. This speed governor is very sensitive, and is found to control the speed well.

Toward the end of the experiment, as the lubricant becomes used up, the friction between the two disks, A, B, increases, and as soon as it reaches an amount greater than the resistance offered by the weight, X, the disk, B, is carried round, and a stop on it comes into contact with the abutment, R, the detent, Q, being at the same time operated upon and the weighted lever, P, liberated, this lever, as it falls, moving the driving belt from the fast to the loose pulley, and so stopping the apparatus.

The curve drawn on the traveling paper indicates, by its greater or less regularity, the general behavior of the lubricant during the experiment, while it also affords a measure of the coefficient of friction. The diagram also indicates the duration of the experiment.

The residue left on the surface of the disk, A, assists, by its appearance, the deductions regarding the value of the lubricant.



Figs. 2 and 3.—TESTING LUBRICANTS.

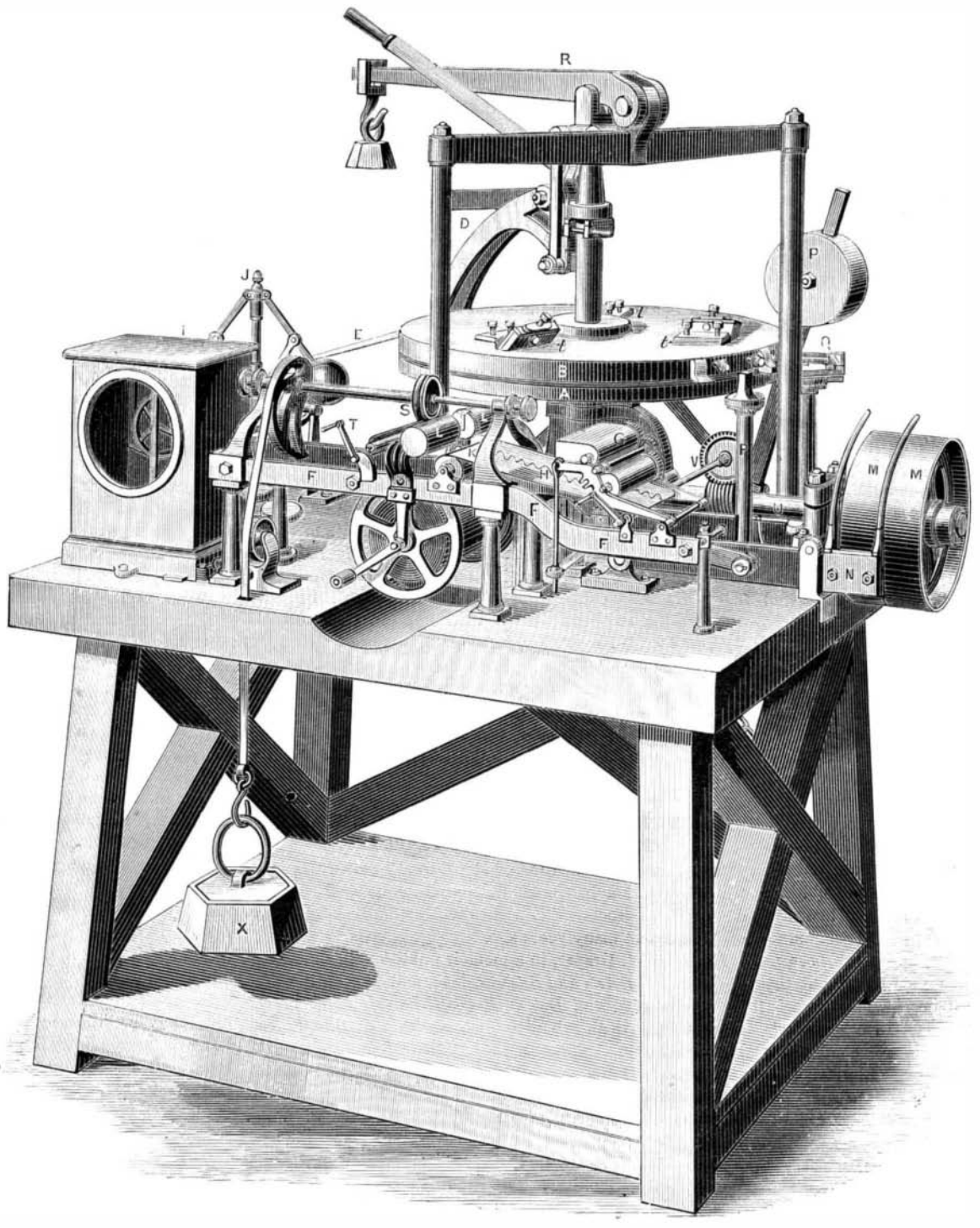


Fig. 1.—MACHINE FOR TESTING LUBRICANTS.

Ether with Cod Liver Oil.

The fact that cod liver oil cannot be tolerated in a very large number of cases where the use of the remedy is indicated, led the New York Therapeutical Society to refer to a committee, for investigation, the claims of Dr. Foster, who first suggested the combination of the oil with ether as a means of overcoming the difficulty. The committee, after an examination of 94 cases, report that the evidence before them warrants the conclusions: (1) That the addition of ether to cod liver oil, in about the proportion of fifteen minims to each half ounce (or an equivalent amount of Hoffman's anodyne instead of ether), will succeed in the vast

majority of cases in enabling the patient to take the oil, even though it previously disagreed; (2) that in some cases in which the oil still disagrees after the addition of the ether, the difficulty may be overcome by giving the ether separately from fifteen minutes to half an hour after the oil is taken. No facts were laid before the committee from which they could judge as to whether the etherized oil is superior to the plain oil in its ultimate effect upon nutrition, supposing them to be equally well tolerated by the stomach.

A FEW NOVELTIES.

The accompanying engraving represents several simple inventions recently patented in the United States. Most of them are of the class that sell for a few cents—a class of inventions that are, as a rule, more profitable than any other.

Fig. 1 shows an improved candlestick invented by Mr. John Frick, of New York city. It is composed of three parts, two of which cross each other and form the base and support for the candle; the third, the disk, is slotted radially to receive the crosspieces, and has a turned-up edge for retaining any tallow that may drip from the candle.

A can opener is shown in Fig. 2; the knife used in it in Fig. 3. This instrument consists of a frame which receives the top of the can, having attached to it a handle and carrying the small knife, which cuts the cover as the opener is turned on the top of the can. Mr. T. F. Wilson, of Washington, D. C., is the inventor of this device.

A fountain mucilage brush, the invention of Mr. J. B. Davids, of New York city, is shown in Fig. 4. It consists of a brush adapted to a bottle, and provided with a tubular handle, having on its upper end an elastic bulb for containing mucilage or any other liquid to be applied with the brush. By compressing the elastic bulb and dipping the brush in the liquid and then allowing it to expand, the liquid is drawn into the bulb through the hollow brush handle, a small hole being provided near the lower end of the handle to admit the liquid.

The improved weighing scoop shown in Figs. 5 and 6 was recently patented by Mr. John Berks, of Ogdensburg, N. Y. It has a spring balance in the handle, and is graduated so that it may be used for measuring as well as weighing.

An improved nozzle for holding dies in the process of hardening is shown in Fig. 7. It is the invention of Mr. Joseph B. Harmstead, of San Francisco, Cal. It is especially designed for use in mints. The face of the die is hardened first, the back being protected by the inwardly projecting rim.

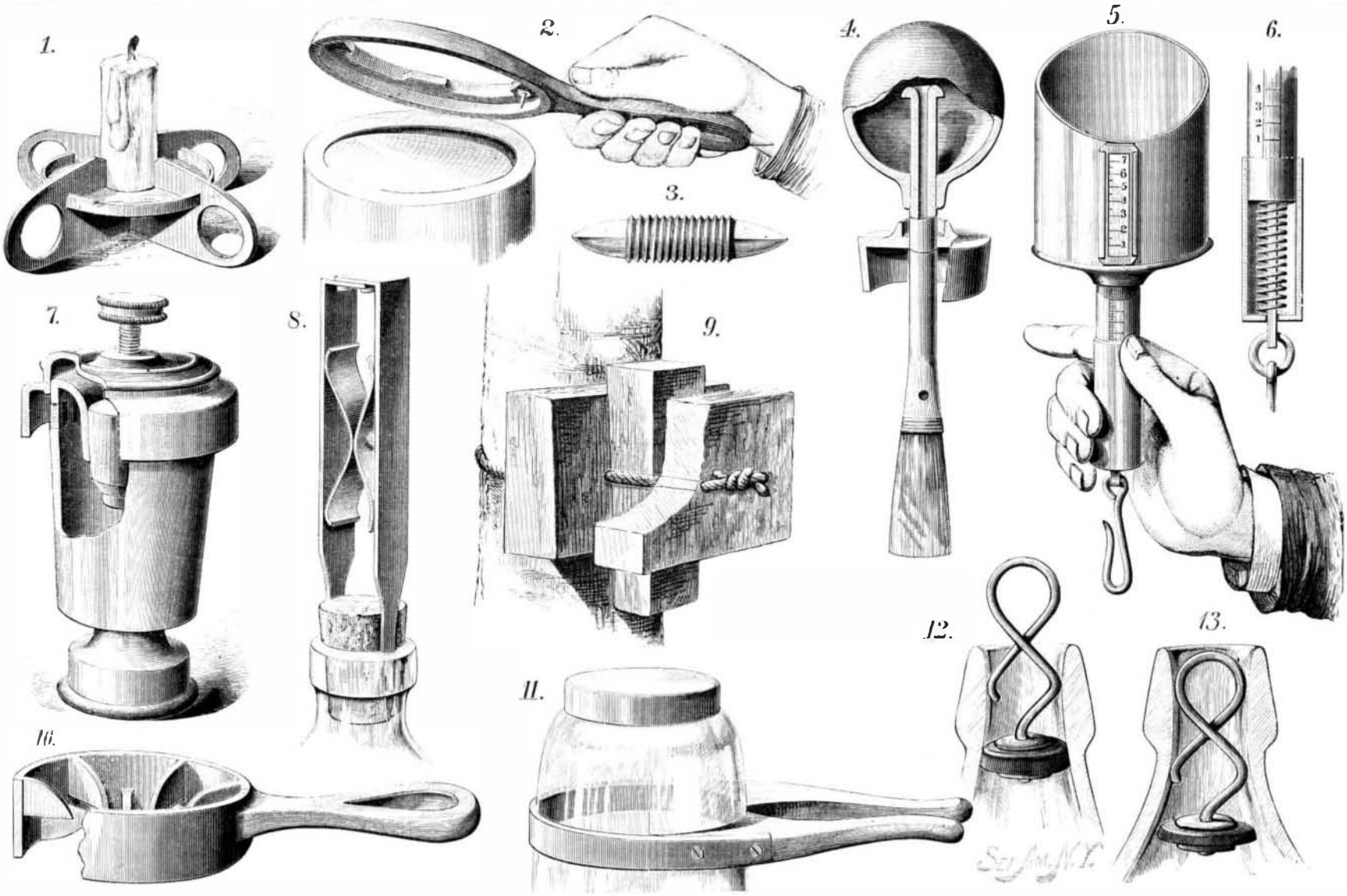
Mr. L. C. Mumford, of San Francisco, Cal., has devised a cork extractor, shown in Fig. 8. It is made wholly of spring sheet metal. Its construction, as well as the manner of using, will be readily understood by reference to the engraving.

Mr. Ezra A. Quinby, of Memory, Iowa, the inventor of the tree compress shown in Fig. 9, claims that by applying the compress so as to prevent the return of the sap to the roots the limbs will mature much earlier than they otherwise would, and will bear fruit earlier and in greater quantities.

Fig. 10 shows a hand corn sheller invented by Mr. George W. Grimes, of Bluffton, Ind. It consists in a ring, provided with two or more rows of inwardly projecting teeth, and having a handle by which it is manipulated. The sheller is held by one hand, and the ear of corn is thrust into it and turned with the other hand.

A simple and effective wrench for holding fruit jars while the cover is applied or removed, is shown in Fig. 11. It is the invention of Messrs. D. Sherman and G. D. Dudley, of Lowell, Mass., and it consists of two handles connected by a band which passes around the jar. The inventors prefer to use wood in its manufacture and to make it entirely of one piece.

The bottle stopper shown in Figs. 12 and 13 is the invention of Mr. C. G. Hutchinson, of Chicago, Ill. It consists of a wire loop of peculiar form, having attached to it a rubber disk which acts as the stopper. Fig. 12 shows the bottle stopped; Fig. 13 shows it open.



RECENTLY PATENTED NOVELTIES.

The Discipline of Education.

A great deal that is said about the importance of classical education as a discipline of the mind largely disregards the operation of ordinary duties in this direction. We can imagine that a young nobleman, so situated as to be above or beyond those compulsory circumstances that force the average man to exertion, would without the discipline of a college education fall into very loose and idle mental habits. College training is with him the only thing that will teach him to govern his desires, to concentrate his attention, and to bring his mind under the control of his will. Without the obligations and stimulus of college life he would be likely to develop into a very slothful and self-indulgent maturity, with little command over his faculties and little inclination to exercise them. It is this fact, we apprehend, that lies at the root of nearly all the utterances that we hear upon the subject—utterances that are for the most part traditional, that are borrowed from the higher ranks of English life, and which are derived from observations purely special and local in their character. They apply with equal force to a small proportion of our own people, it being evident that young men of wealth would sink into marked inferiority if educational discipline did not extend well into their manhood. But we are convinced that the requirements of the schools, the mental training which comes of a study of the ancient languages and the higher mathematics, are far from being so completely disciplinary as the ordinary experiences of the professions and the trades. The lawyer in his practice soon gains the power of concentration, and is fairly compelled to bring his mind under the control of his will, his discipline being more thorough, more exacting, more sustained, than any that can be invented by college systems. The daily experience of the physician is likewise efficient in bringing all the functions of the mind into subordination and under control. It is only by sustained effort and severe concentration that the man of letters can succeed; the painter and the poet are helpless if their intellectual powers are not fully at their command. It will be said here that the exact purpose of college discipline is to prepare men for these exacting duties. But in our observation training at college bears so small a proportion to that which comes with the competitions of life that it is scarcely traceable We have always found that men whose necessities force them to bend their energies to work are the men who hold themselves well in hand, and that other men usually have little power of application; that is, the classification does not distinguish between educated and uneducated men, but between working and non-working men. In the list of men who have attained success or contributed notably to the world's advance, it will not be found that those who have exhibited remarkable mental power and intellectual self-command are specially on the side of the university class. Three of the most conspicuous men in English philosophy and science—Herbert Spencer, Huxley, and Tyndall—have developed their remarkable powers from the impulses of their natural gifts and not by the aid of college discipline or classical guiding. Perhaps their labors would have been easier under a thorough preparatory course—this is not easy to gainsay—but the fact remains that in the pursuit of their several ends they have brought their mental forces under complete and perfect control. Necessity is the great master, and it operates on all classes of society—it gives the power of concentration to the lawyer, teaches the physician to be self-contained and studious, gives efficiency to the pen of the writer, drills the bookkeeper and the clerk, and trains the hand of the artisan. It is an ever-present and most exacting schoolmaster; and, as with an immense majority of people this schoolmaster begins his lessons in youth by means of the struggles and burdens of life, and continues them without relaxation to the end, the discipline within certain limits is complete—the self-control being general, but the proficiency lying, in each case, solely along the line of experience. —*Appletons' Journal.*

The Formation of Character.

There is a practical as well as a scientific basis for the position taken by the Rev. Phillips Brooks in a recent discourse in this city, namely, that the law of evolution rules in the moral as well as in the physical world. Nature does not create, but is always developing. In last summer's roots nature finds the germ for next summer's verdure.

"If somebody should give me a diamond to carry to Europe, I can know exactly how much would be lost to the world were I to drop it into the sea; but if a seed should be given me, I can only regard it with awe as containing concealed within it the food of untold generations. That is the difference between looking at truth as a diamond or as a seed —as final or germinal.

"In all training of character, continuity and economy must be supreme. The notion that character is spontaneous is held by most people in the earlier portion of their lives, and is wrong. When they discover this, nine tenths change to the other extreme. This is wrong too. Hosts of young men think that their character will form of itself and that they will necessarily become better as they grow older. Hosts of old men believe that their character is fixed and that it is impossible for them to become better. Such beliefs are foolish. People are also wrong in thinking that they can put off their bad traits and put on good traits. The old failures cannot