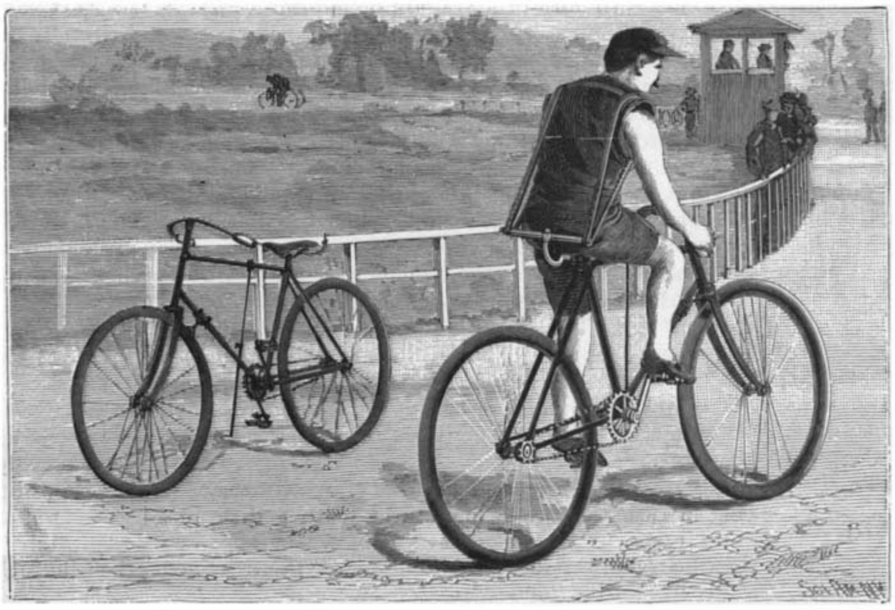
IMPROVEMENTS OF INTEREST TO BICYCLE RIDERS.

An improvement designed to enable the rider to propel his machine with increased power, by attaching to it a support affording a resistance above the shoulders, is shown in the accompanying illustration. It has been patented by Mr. Estanislao Caballero de los Olivos, of No. 34 West Fifteenth Street, New York City. To the rear of the saddle frame a curved rod is secured by a clip, the vertical outer portion of the rod having a collar on which rests a transverse bar to which are attached the straps of a shoulder brace. In the transverse bar is a spring-pressed slide, adapted to engage a notch in the vertical support, but by pressing upon a button on the outer end of a rod extending from the slide to one end of the bar the latter is disengaged from its support, freeing the brace from attachment to the machine and relieving the rider from its tension. As the straps afford a resistance or fulcrum above the shoulders of the rider, he is enabled, by means of the brace, to exert a considerably greater downward pressure with his feet. The straps preferably have pads, and yokes or other forms of support may be substituted for them, as may best accommodate the rider. Another improvement of the same inventor is also represented in the illustration, consisting of a light and simple form of stand by which the bicycle may be supported in upright position when not in use. It is a telescoping leg or rod whose upper end is attached to the top bar of the frame, the lower end of the bottom section, when extended, reaching the ground and forming a rest when the machine is tipped slightly to one side. When the sections are closed up, the lower end of the extensible leg is secured to the lower bar of the frame. On the lower bar is also a short spring arm, carrying a shoe, adapted to be sprung into engagement with and form a lock upon the tire of the front wheel when the machine is at rest, preventing the turning of the wheels.



CABALLERO'S BICYCLE SHOULDER BRACE AND BICYCLE STAND.

JAPANESE CLOCKS.

The Japanese are the only ones outside of western Europe who have constructed clocks having a peculiar character, and the manufacture of them dates from the end of the sixteenth or the beginning of the seventeenth century. Their first attempts were made after they had seen the European types that were brought to them, but they soon devised systems of dials and movements more in keeping with their method of counting the hours.

Among the various systems that are peculiar to them, let us describe that which we illustrate in Fig. 1. This piece, which dates from the beginning of this century, consists of a well-made wooden case, containing the clock, which is of gilded copper. The movement shows perfect workmanship and the back pillar plate is carefully decorated with fine engravings. The skill of the Japanese in matters of clockwork is indisputable, and the decoration of their clocks is often most charming. We shall explain the peculiarities of the dial of this clock and the manner in which the hours, days, days of the month and moons are counted.

In Japan, the civil day consists of twelve hours only, instead of twenty-four. There are six of the day and six of night. The six diurnal hours are counted from the rising to the setting of the sun, and the six nocturnal ones from its setting to its rising. So, the days and nights have equal hours twice a year only, that is to say, at the equinoxes, while at the solstices the disproportion is considerable. The division of the two periods, diurnal and nocturnal, usually of unequal length, requires that the six divisions that compose them shall themselves be unequal; hence hours of greater or less length. On the long days, for example, the six hours of the night are shorter than those of the day. Sometimes, therefore, it is the hours of the day that lengthen to the detriment of the night, and sometimes the contrary is the case, according to the time of the year.

This manner of dividing the year is not exclusively Japanese, for it was universally employed in antiquity. It is what is called the natural day, while our day, which is divided into equal parts, without regard to the rising or setting of the sun, is called the artificial day. But in Japan, the thing is strangely complicated when it is necessary to count the hours. It would seem that nothing was more simple than to count the twelve parts of the day from 1 to 12. Such simplicity has been disdained in Japan, and the process adopted is as follows: As nine is regarded as the perfect number, midnight and noon are called 9 o'clock. Thus noon will be 9 o'clock of the day and midnight 9 o'clock of the night, while the rising and setting of the sun are either 6 o'clock of the day or 6 o'clock of the night. If it be asked how nine can be found twice in twelve, we answer that the seeming arithmetical impossibility will be overcome if we begin to count by four, which will allow us to finish by the perfect number nine. The intermediate numbers are developed thus: Twice 9 is 18; suppress the decimal figure and eight remains; that is why the hour that follows noon or midnight, that is to say, the second hour, is 8 o'clock of the day or night. Three times 9 is 27; suppress the decimal as before, and there remains 7, which makes the third hour, and so on.

In order to mark these hours and obtain the equation of the days, the Japanese have employed various systems; sometimes that of the balance shown in the clock in Fig. 2, and sometimes that of the dial, as in Fig. 1.

In the first of these systems, the balance consists of a vertical rod upon which is horizontally mounted a strip of metal whose upper edge is notched and from which are suspended two small metallic weights that may be moved at will from or toward the axis in order to quicken or slacken the movement of it. In the long days, for example, the two weights are placed at the hour of sunrise at the extremity of the balance, and the hours are marked slowly. When the hour of sunset arrives, they are placed near the center of the axis and the hours of the night pass much more rapidly. There are thus obtained, by a proper regulation, the long hours for the long days and the short ones for night.

In the system of regulation by the circular dial, the latter consists of twelve sliding cards, upon which the hours are painted, and which are so mounted in the disk that they can be easily moved away from or toward each other. In the long days, for example, the six cards that serve to mark the diurnal hours are widely spaced, and the six that serve to mark the night hours are proportionally moved closer together.

The equation of the days is therefore operated by the proportionate spacing of the cards by hand. It is necessary to add that in this system the complete dial is revolved by the movement, and the hours present themselves successively before the hand, which is stationary. The six hours of the day and the six of the night constituting the complete day have a name as well as a figure. But the complete day, instead of being composed of two periods of six, comprises twelve names corresponding to the signs of their Zodiac. These are: The Rat for midnight or 9 o'clock. The Ox for 8 o'clock. The Tiger for 7 o'clock. The Rabbit for 6 o'clock. The Dragon for 5 o'clock. The Serpent for 4 o'clock. The Horse for noon or 9 o'clock. The Goat for 8 o'clock. The Monkey for 7 o'clock. The Cock for 6 o'clock. The Dog for 5 o'clock. The Boar for 4 o'clock.

We give a facsimile, Fig. 3, of these twelve subjects; but upon the clock dials that represent them they are figured only by characters answering to their names. The dial that we reproduce belongs to a system of clock other than the one of which we speak.

Each of the twelve hours is divided into ten parts.

The use of the twelve branches to designate the hours is borrowed from the Chinese, but the other combination for counting the six hours is, as has been said, peculiar to the Japanese.

Having spoken of the hours, we shall explain how the days of the month and moons are indicated. In two small apertures situated beneath the dial (Fig. 4) appear Japanese characters. In one, that to the left, are the signs of the Zodiac. They represent the days to the number of twelve, which are the same as those of the hours, and so in Japan one may be at the same time at the hour of the Cock, the day of the Cock, the month of the Cock and even the year of the Cock.

To the right is the month represented by one of the ten elements. In order to obtain the day of the moon (for the year is lunar, and not solar, as with us), the twelve signs

Fig. 1.—PORTABLE JAPANESE CLOCK.

Fig. 2.—JAPANESE CLOCK WITH WEIGHTED BALANCE.

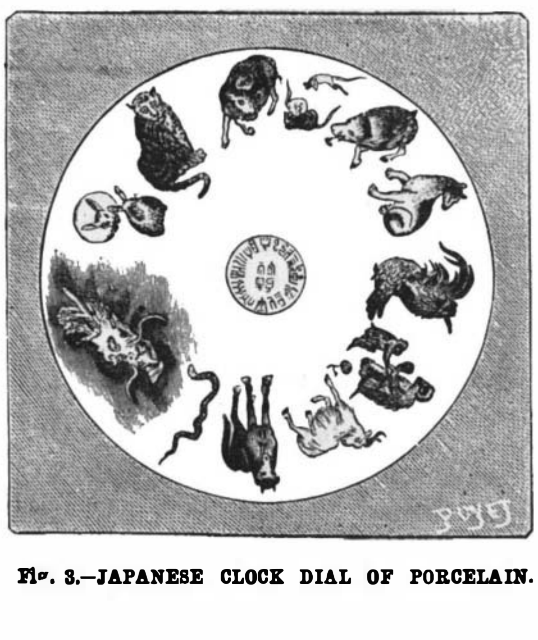


Fig. 3.—JAPANESE CLOCK DIAL OF PORCELAIN.

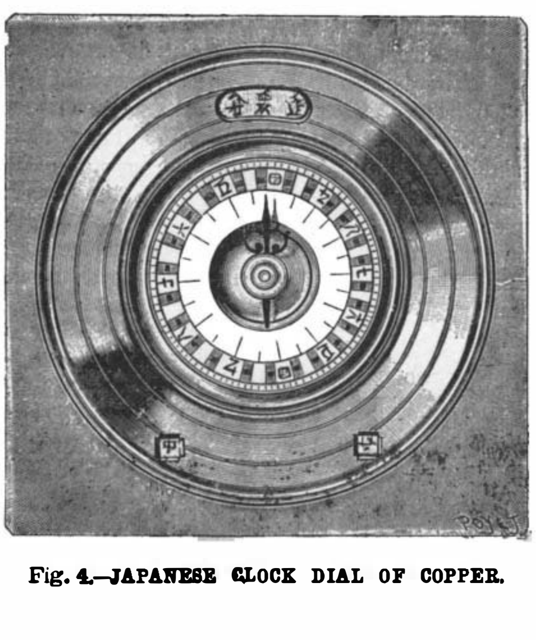


Fig. 4.—JAPANESE CLOCK DIAL OF COPPER.

of the Zodiac are combined with the five elements, which are wood, fire, earth, metal and water. These are doubled by regarding them in two different states, to wit: first, in their natural state and then as adapted to the use of man. Thus, wood in its natural state as a tree is the first element, which becomes the second when cut down and converted into timber. Fire, the third element in its original state, as solar light, etc., becomes the fourth element lighted by man with wood, oil, etc. Earth, the fifth element in its uncultivated state upon mountain tops or at the bottom of the sea, constitutes the sixth element when it is worked by the hand of man and changed into porcelain, pottery, etc. Metal, which is the seventh, considered as an ore, becomes the eighth when molten, worked and converted into tools. Water forms the ninth element, such as it falls from springs and flows into rivers. It is the tenth when stagnant in ponds or escaping from a reservoir.

In order to know what day it is, we consult one of the two apertures, that to the left. A wheel, actuated by the movement, revolves by one tooth, which forces the dial upon which the signs are engraved to present a new one. The number of the teeth is twelve, corresponding to the twelve signs.

The day of the month is indicated in the aperture to the right in the same way by a character which is that of one of the ten elements that we have enumerated above. The wheel that causes them to operate has ten teeth which gear with the wheel of the twelve days. The ratio of these two wheels in their revolution is such that every sixty days only the same signs return in concordance as at their starting point, this corresponding to two moons.

It is by combining the relation of the two signs in presence that we obtain the day of the month. Let us, for example, take the sign of the Rat, visible in one of the apertures, and Wood, first state. In the other we shall have the first day of the moon. The next day we shall have the Ox in presence of the Wood, second state, and so on until the eleventh day, in which we find the Dog in presence of the Wood, first state, and the next or twelfth day, the Boar with the Wood, second state. On the thirteenth day the Rat returns to present itself with the Fire, first state, and so on up to sixty.

In the top aperture is indicated the fortnight or half moon marked by twenty-four signs that present themselves in succession. The wheelwork of the movement actuates the wheel that carries them, and this wheel makes its revolution in a year of three hundred and sixty days. A distinction is made between the first and second fortnight of the moon.

These three indications, of which we have just spoken, permitted, when they were united, of knowing what was the day, the day of the month and the fortnight of the year. It was, upon the whole, what in another manner was marked and is still marked by certain of our European clocks. We should add that since 1872 the Japanese have been employing our method of counting and marking the hours.—La Nature.

Irone.

In the alcoholic extract of orris root the inventor has discovered a new substance, which is the aromatic principle of the root, which he gives the name "irone." It is a ketone, having the formula $C_{13}H_{20}O$. This body has the characteristic odor and flavor of the orris root, and may be preferentially employed in perfumery, etc. Its preparation is carried out thus: The alcoholic or ethereal extract of the root is distilled in a current of steam. Organic acids, ethers, alcohols, and irone pass over into the distillate, which is then treated with ether and the ethereal solution agitated with a dilute alkali solution, in order to separate the free acids. The mixture is evaporated down and the residue dissolved in alcohol, which solution is mixed at the ordinary temperature with a weak solution of an alkaline hydrate in order to saponify the ethers of the organic acids. After some minutes it is poured into water, the neutral oils are dissolved in ether, the ether is evaporated, and the residue distilled in a current of steam. Irone is one of the bodies distilling over first, and by repeating this operation several times it may be obtained fairly pure, but still containing small quantities of aldehydes, which are eliminated by treatment with weak oxidizing agents. The irone is then converted into its phenylhydrazone or condensed with another substituted ammonia to a ketone, from which bodies it is obtained by decomposing with dilute acids and distilling.

Irone boils at 144° C. under a pressure of 16 mm. and has a specific gravity of 0·939.—J. C. W. F. Tiemann, Berlin.

MOST medical men consider that a cold bath every morning is apt to do more harm than good to any but persons of a very vigorous constitution. The sensible thing to do is to see that the temperature of the water in cold weather is not lower than that of the air. A daily bath is a most healthful practice; but it should not be so cold as to give a shock to the system.

Limes and Cements.

A very interesting and valuable monograph is that entitled "Portland Cement," by Charles D. Jameson, professor of engineering, State University of Iowa. It contains, within a comparatively small compass, a large amount of information of the precise authentic kind the engineer, builder, director, or owner of buildings or masonry works ought to know. First is presented certain general considerations, showing that while lime and cement enter into almost every form of engineering construction, their ultimate value depends more upon the manner in which they are used than is the case with most other building materials. Says our author:

"Take wood, stone, or iron, for example. Provided a good quality has been selected, nothing the constructor can do will materially affect this quality. The material may be used injudiciously and uneconomically, but the ultimate strength remains the same. A square inch of steel will stand about the same tensile strain under all circumstances. With limes and cements, however, this is not the case. No matter how perfect the original quality of the cement may be, it may become absolutely worthless and a source of danger, if not properly handled and applied after being received.

"This fact makes it of the utmost importance that, at least, all engineers should be familiar with the manufacture, use, and methods of testing limes and cements.

"The engineer should be able to recognize a good cement when he gets it, and if it is not good, to indicate the probable reason of its failure, whether in the raw material, the method of making, or the treatment it received after the making.

"Both lime and cement, when used for building purposes, are mixed with a certain amount of water and used in a more or less plastic condition. While in this plastic condition they are placed in the work in whatever position or form is required and then this mixture hardens with more or less rapidity.

"This hardening is called setting, and it is this property of setting under different conditions that forms one of the radical differences between limes and cements.

"Lime mortar will only set when exposed to the action of the air, and therefore can only be used in layers so thin that the air can penetrate to all parts of it. All parts of this lime mortar must not only be accessible to the air, but to insure setting, the air must be dry.

"Where lime mortar has been used in cellars that are damp and in the plastering of houses exposed to the damp sea winds its absorption of moisture has been so great that it never has become thoroughly set, and is always more or less damp and soft. With cement and cement mortar this is not the case.

"A mixture of cement and water, properly made, will not only set in the open air, but will set when immersed in water or when in a vacuum. That is, contact with the air is not necessary, in order that the process of setting may take place. In fact, not only is contact with the air not necessary for the setting of cement, but in order that the maximum results may be reached, all cement mortar should be kept either wet or immersed until it has become thoroughly set.

"This may be considered as one of the most important rules governing the use of cement, viz.:

"The quality of any cement work is very materially improved by keeping it wet during the process of setting. From this fact, that contact with the air is not necessary for the proper setting of cement, it is evident that there is almost no limit to the mass of cement mortar or concrete that can be used. No matter how massive the structure may be, and no matter in what thickness the cement mortar or concrete may have been used, if the proper materials have been properly manipulated, this mass will set thoroughly throughout. Therefore, while lime can only be used in a dry location and in thin layers, cement can be used in any location and in any quantities.

"Lime mortar under the best of circumstances has very little strength, either of adhesion or cohesion, while the best Portland cements properly used attain a strength superior to that of any of the building stones, with the exception of some granites, quartzites, and trap.

"The general differences between limes and cements, from an engineering standpoint, may be taken as lying in the fact that limes will set only in contact with dry air, while for the setting of cement, not only is the presence of dry air not necessary, but the best results obtain when the cement is kept wet or immersed in water.

"There can be no sharp line drawn between limes and cements, although there is no difficulty in distinguishing at sight between pure lime and good cements.

"The ordinary lime of commerce consists of the calcined carbonate of lime in a state of greater or less purity.

"The constituents of cement are carbonate of lime, silica, and alumina with iron, with a few other ingredients of more or less importance. These three, carbonate of lime, silica, and alumina, with iron, however, are the most important, and are always present in varying proportions. It is the relative proportions in which these constituents are mixed that make the resulting cement more or less hydraulic, that is, the power of setting under water, as the hydraulicity of the resulting compound varies as the percentage of the ingredients vary. We have cementing compounds from pure lime at one end of the list to Portland cement at the other. They can be divided into the following three classes: Lime, hydraulic lime, and cement.

"Lime consists of practically pure carbonate of lime with less than 10 per cent of impurities.

"Hydraulic lime has mixed with the lime from 10 to 25 per cent of silica, alumina and iron.

"Cement contains:

Lime	55 to 65 per cent.
Silica	18 to 24 "
Alumina and iron	8 to 14 "

"These usually amount to 94 or 96 per cent of the whole. The balance may be made of magnesia, alkalies and sulphuric anhydride. These last are present in minute quantities, and although they undoubtedly have some influence upon the qualities of the cement, still this effect is very slight.

"Lime.—Lime is made by the simple calcination of more or less pure carbonate of lime. This is found as limestone in all parts of the world. The calcination is done usually in a kiln. The fuel most commonly used is wood, but either soft coal or coke may be used. The method of charging the kiln is as follows: A rough, open arch is built of limestone above the bottom of the kiln. Upon this is placed a layer of fuel, then a layer of limestone, a layer of fuel, and so on, alternately, to the top of the kiln. The layers of fuel grow less as the top is approached. The fire is started at the bottom and the temperature gradually increases. As the fuel is consumed the limestone drops toward the bottom, and more fuel and limestone is added at the top. As rapidly as the limestone becomes sufficiently burned it is removed from the bottom of the kiln. It comes from the kiln in hard, white, rock-like pieces.

"One peculiarity of the freshly burned lime is the great avidity it has for water, and, when it is exposed to moisture, the great amount of carbon it will absorb.

"Lime that has not been exposed to moisture, and is in more or less the same condition in which it came from the kiln, is called quicklime. When this lime has been exposed to moisture in any shape, and allowed to absorb as much as possible, it is called slaked lime.

"All lime, before being used, must be slaked. This can be done by drowning, sprinkling, or exposure to the air.

"Drowning.—The quicklime is spread out in a watertight box and water added until it is completely covered. The entire amount of water needed should be put in at once. When the water is added the temperature rises, the mass effervesces, the quicklime increases rapidly in bulk, slowly disintegrates, and finally falls to pieces in a fine white powder, soluble in water. The impurities are separated from the lime. If additional water is added after the process of slaking has commenced the temperature is lowered and the slaking is not done as thoroughly as it otherwise would be. After the water has been added it is a good plan to cover the box so as to retain the heat as much as possible.

"The increase in bulk due to slaking is 200 or 300 per cent. The lime, after the slaking is complete, is run off through an opening in one end of the box. It is about the consistency of very thick cream. The opening is covered with a grating or netting to prevent the passage of hard lumps, etc. The slaked lime is run either into another box or into an excavation in the ground, this second box or excavation being many times larger than the slaking box. The slaked lime soon becomes a stiff paste, and should be covered with sand or boards. It should not be used for mortar for a number of days, usually about ten, until it has become thoroughly cool.

"Slaking by Sprinkling.—The quicklime is spread out in a layer 6 or 8 inches in thickness, and thoroughly sprinkled with water. It slowly disintegrates and falls into powder. There is no great increase in the temperature, and no effervescence takes place. One drawback to this method is the space and time required, which are both much greater than is required for drowning, and there is no reliable data to show that the lime thus slaked is in any way improved.

"Air Slaking.—The lime is spread in layers 4 to 6 inches thick, and exposed to the air. It must be turned a number of times in order to insure thorough exposure to the air. The time and space required are both very great and the gain, if any, small. Thoroughly slaked lime paste can be put up in airtight casks and kept without deteriorating for almost any length of time.

"Hydraulic lime is made by the simple calcination of limestone that contains anywhere from 10 to 25 per cent of the requisite impurities. The temperature required for calcination is but slightly higher than that needed for the burning of quicklime. The material must be slaked the same as quicklime before it can be used, and is reduced to powder in this way. No grinding machinery for reduction is used. The slaking is much slower than is the case with quicklime, and as the proportion of impurities increases it becomes slower and slower, until at last a point is reached where the resulting substance passes from hydraulic lime to natural cement. The reduction must be done by grinding and the hydraulicity becomes a prominent characteristic.

"Cement.—Cement as used in an engineering sense means such a combination of lime, silica, alumina and iron, that when properly calcined, reduced to powder, and gaged with a proper amount of water, has the property of setting under water and in places where it is not exposed to the action of the air. It also has the property of setting when in contact with the air.

"For good results to obtain, the proportion of the requisite constituents must be within certain narrow and well-defined limits. These proportions have already been given.

"The cements used in building construction can be divided into two general classes, natural cement and artificial or Portland cements.

"The term Portland cement means an artificial cement as distinguished from natural cement.

"Natural Cements.—In many parts of this country and Europe there have been found immense deposits of impure limestone, that contain with more or less accuracy the necessary constituents for the making of cement. These constituents have been mixed by nature and for cement making must be used in the proportions found.

"The difference between the natural and Portland cements as to the raw materials used is this:

"The desirable constituents in each are the same.

"In making natural cements, some impure limestone that contains as nearly as may be the correct proportions of lime, silica, and alumina is used, and the value of the resulting cement depends upon the correctness with which nature has mixed these ingredients. It is found good, bad, and indifferent.

"With the raw material for Portland cement, however. nothing is left to chance. It is known, within certain narrow limits, what the constituents should be and in what proportions they should be present. This being known, such materials are used as contain these constituents in a more or less pure state, and then these comparatively pure raw materials are mechanically mixed in the correct proportions.

"The mere fact that the raw materials are nearly perfect does not insure good cement, as the best of raw material may be rendered useless by improper burning or grinding. But, on the other hand, no good cement is possible unless the raw materials are good. Of course any mechanical mixture of lime, silica, alumina, etc., within the limits named, will give good Portland cement if properly burned and ground. But in selecting raw material there is one other, most important, question that must be considered, viz., that of cost.

"In order to make a perfect mechanical mixture the materials must be reduced to an impalpable powder. The harder the materials, the more expensive this is; consequently, in selecting the raw material, the question of the cost of reduction must be considered.

"The advantages of Portland cement over natural cement are two, viz.:

"1st. The Portland cement is much better per se. The best natural cement never attains the hardness nor has the strength or durability of the most ordinary Portland.

"2d. Where proper care is used, Portland cement of any one brand possesses a uniformity of quality that can never be attained in the making of natural cement.

"Examine almost any stone quarry, and the impossibility of obtaining a uniform quality of stone in any quantity will be seen at once. The quality of the stone varies in different parts of the quarry and in different layers of the stone, no two layers containing the same chemical constituents. As the stone is used in the condition in which it comes from the quarry, it will be seen that there will be an unavoidable variation in the quality of the resulting cements.

"With Portland cement this is different. The raw materials are practically pure, and after experiments have given the proportions of mixing and the subsequent methods of treatment, there is no excuse for any irregularity in the results.

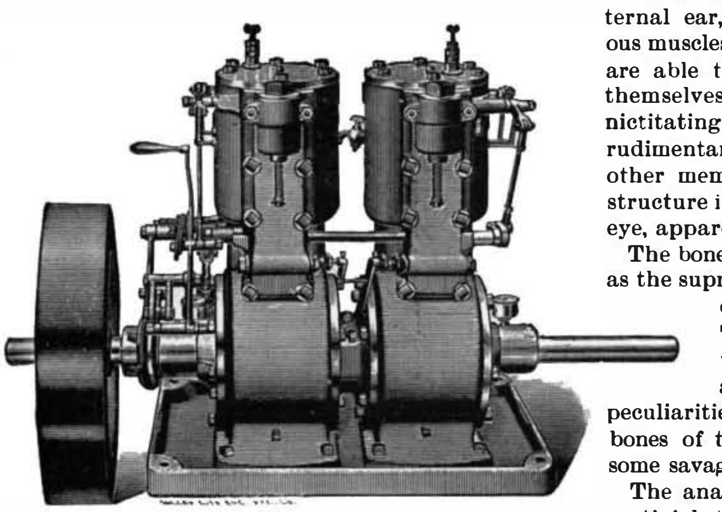
"This uniformity in results is the one great point to be worked for in cement making. It can only be accomplished by the exercise of the greatest care in the selection and treatment of the raw materials. In the process of making there are some radical differences between natural and Portland cements. In the calcination the natural cements require a temperature but little above that required for lime burning, while the Portland cements require a temperature just short of that required for vitrification. The mixing, grinding, etc., all increase the cost of the Portland until at last the finished product brings about $3 per barrel on the market, while the natural cement sells for 50 cents.

"True economy in the choice of cements consists in using the one best adapted for the work in hand. When the work is such as to justify the increased expense on account of required durability or strength, then the best Portlands should be used. But on less important work or masonry of a cheaper character, the natural cements should be used. Nothing has done more to improve the character of all masonry work during the last twenty-five years than the cheapness and excellency of these light-burned natural cements."

The author then presents interesting historical data relating to the uses and manufacture of cements, the processes relating thereto, the machinery employed, the various tests of cement, abstracts from specifications, directions for using cements in various kinds of works, making of concrete for roads and foundations, cement sidewalks and pavements, etc. The practical information contained in this work is of rare value.

A NEW GASOLINE MOTOR FOR BOATS AND LAUNCHES.

A motor which can be started without turning the fly wheel by hand, by simply using the reverse lever, and which may be handled the same as a steam engine, without requiring a boiler, feed pump, etc., is shown in the accompanying illustration. It has been recently brought out at the Wolverine Motor Works, Grand Rapids, Mich. These motors are perfectly balanced, the cranks being directly opposite each other, and one going down as the other goes up, permitting them to be run at a very high speed without jarring the boat. There is no gearing on the engine or propeller shaft to make a noise, and the engine can be reversed by simply moving one lever. It is free from any possibility of fire or explosion, requires no licensed engineer or pilot, and can be operated by any one, man or woman, after an hour's instruction, or from the printed directions. It can be run slow or fast by the use of the throttle lever. Preferably the common solid propeller wheel is employed, made in one piece, rigidly connected to the propeller shaft, the latter being rigidly connected to the crank shaft of the motor.



WOLVERINE DOUBLE CYLINDER MARINE MOTOR.

It is claimed that this motor is not only one of the simplest to operate, but that it embodies more valuable features than it has heretofore been considered possible to combine in a gas engine.

Some Vestigial Structures in Man.

BY W. E. ROTZELL, M.D., NARBERTH, PA.

The term vestigial is used in anatomy as being more convenient in describing those parts generally known as rudimentary, abortive, atrophied, or useless. There are many vestigial structures in man, and an attempt to more than mention some of the most interesting of them would far exceed the limits of this article.

The appendix vermiformis is a vestigial structure, and, like all such structures, has no function to perform in the organism. "Not only is it useless," says Darwin (Descent of Man, New York, page 21), "but it is sometimes the cause of death."

The vermiform appendix is, doubtless, the remains of the much elongated caecum that is found in the majority of the herbivorous mammals. The usefulness of the tonsils is also doubtful. They are, as we all know, frequently the seat of disease, and after removal the individual realizes no inconvenience from the loss. Of what utility are the cervical auricles that occasionally occur in man, or the supernumerary legs, fingers, and toes, as well as all the other abnormalities that frequently occur?

Among the lower animals there are numerous instances of useless organs, such as the clavicle of the cat, the teeth of a whale, or the sting of a bee or wasp, which when used, as a rule, causes the death of its owner. Referring to insects, Professor Graber (Die Insecten, Munich) says: "There are also numerous structures and organs which may, with absolute certainty, be pointed to as perfectly useless." "But seeing that so enormous a number of specific peculiarities are in the same predicament, it surely becomes the reverse of reasonable so to pin our faith to natural selection as to conclude that all these peculiarities must be useful, whether or not we can perceive their utility. For by doing this we are but reasoning in a circle. The only evidence we have of natural selection is furnished by the observed utility of innumerable structures and instincts which, for the most part, are generic, family, or higher order of taxonomic value. Therefore, unless we reason in a circle, it is not competent to argue that the apparently useless structures and instincts of specific value are due to some kind of utility which we are unable to perceive."

The third molars, or wisdom teeth, are becoming vestigial in civilized man. These teeth are now, as a rule, the last to come and the first to disappear; they are smaller and more variable than the other molars and have only two separate fangs.

The body of adult man is always more or less covered with hair; this hair is the remains of the more extensive hairy covering possessed by his ancestors. An interesting fact in relation to this hairy covering is that the hair on the arm and forearm is directed toward the elbow—a characteristic which occurs only in the anthropoid apes and the American monkeys. The explanation of this has been given by Wallace (Natural Selection and Tropical Nature, London, page 194), who states that the orang, when resting, holds its long arms upward over its head, so that the rain flows down both the arm and forearm to the long hair which meets at the elbow. In accordance with this principle, the hair is always longer or more dense along the spine, often rising into a crest of hair or bristles on the ridge of the back. In the entire series of the mammalia, from the monotremata to the quadrumana, this character is very prominent.

It is a well known fact in embryology, that at about the sixth month the human fœtus is frequently covered with rather long dark hair over the entire body, except the soles of the feet and the palms of the hands. This covering of hair is shed before birth, and so it is apparently useless except as being an evidence of evolution.

Other vestigial structures are the muscles of the external ear, and the panniculus carnosis, subcutaneous muscles by which a large number of the mammalia are able to freely move their skin, thus protecting themselves from insects. The plica semilunaris, or nictitating membrane, the semitransparent eyelid, is rudimentary in man and other mammals, while in the other members of the vertebrata the function of this structure is to sweep over the external surface of the eye, apparently to keep the surface clear.

The bones of man present such vestigial peculiarities as the supracondyloid foramen, which occasionally occurs; it is normal in the lower quadrumana. There is also the intercondyloid foramen, which occurs in man and the anthropoid apes, but is not constant in either. These peculiarities are found to be more common in the bones of the ancient races of mankind, and also in some savage races.

The anatomy of man presents a large number of vestigial structures, each of which throws some light on the long line of his ancestral history, and that can only be accounted for as explained by evolution.—Abstracts from the Hahnemannian Monthly.

Fish and Game Laws.

Here is a summary of the law of New York State relative thereto, as revised and amended by the last legislature:

Fish.—Polluting streams or taking fish by drawing off water or by dynamite, or taken from a stream to stock a private pond or stream prohibited. No fishing through the ice in waters inhabited by trout or salmon.

Trout.—Open season from April 16 to August 31, with 6 inch limit.

Salmon, Trout, and Landlocked Salmon.—Open season from May 1 to September 30.

Bass.—Open season from May 30 to December 31. Bass 8 inch limit.

Pickerel, Pike and Wall-eyed Pike.—Shall not be fished for, caught, killed or possessed, except from May 1 to January 31, except as provided in section 141 of the game laws.

Deer.—Open season August 16 to October 31. Limit, two deer to each person.

Squirrels, Hares, and Rabbits.—Open season from September 1 to November 30. Ferrets prohibited.

Birds and Wild Fowl.—Web-footed wild fowl, open season from September 1 to April 30. Quail, open season November and December. Woodcock and grouse, open season from August 16 to December 31. Plover, snipe, and English snipe shall not be shot or possessed during May, June, July, or August. Snaring, netting, or trapping of game birds prohibited.

As to private parks or grounds, the law is not changed from last year.

Dealers may have game or birds in possession out of season provided that they can show the same was shipped to them from a point over 300 miles from the borders of this State.