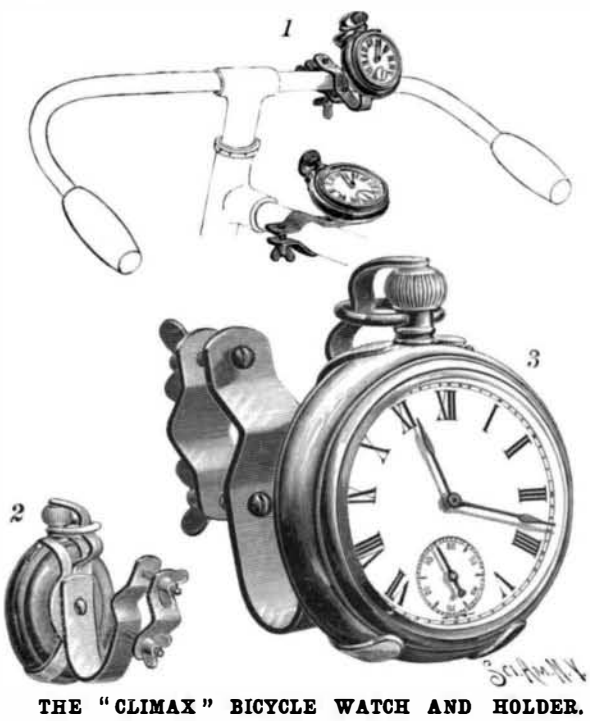
THE "CLIMAX" BICYCLE WATCH AND HOLDER.

Whether one is "making time" on a wheel or leisurely following where fancy may lead over new paths, the convenience of having the correct time always at hand, to be noted without the trouble of taking a watch out of the pocket, or taking the hands from the handle bars, cannot but be appreciated by all bicyclists. The improvements which have made this possible have, therefore, at once sprung into great popularity. The illustration represents a time-telling



THE "CLIMAX" BICYCLE WATCH AND HOLDER.

outfit of this kind manufactured by Messrs. Robt. H. Ingersoll & Brother, of No. 65 Cortlandt Street, New York, and which consists of an excellent low-priced watch and a simple, light and easily applied holder. The watch is without fine adjustments, heavy wheels and fine pivots, being designed to stand any amount of banging and shaking without losing or gaining a minute a day. By means of the holder it may be attached in a moment to either the frame or the handle bar, as shown in Fig. 1, Fig. 2 representing a back view and Fig. 3 a face view of the watch clamped in the holder. As will be seen, the watch is held by spring fingers, an upper finger engaged by the watch ring straddling the stem and holding the watch firmly in the clutch of the lower fingers. By releasing the ring the watch is readily removed. With a pair of pliers this holder may be fitted to any case.

AN ARTIFICIAL SPECTRUM.

That the different colors of the spectrum may be reunited so as to produce white light has been known for a long time, but the method of obtaining all the colors of the spectrum without the use of any other optical apparatus than the eye itself and its faculty of accommodation is recent and not so well known, and is worthy of notice.

According to Engineering, it was Mr. Charles E. Benham, of Colchester, England, who was the first to obtain the artificial spectrum of which physicists have, for the last five months, sought with more or less success a satisfactory explanation. Such explanation seems to have been quite recently furnished by Mr. Macfarlane Gray.

The artificial spectrum is obtained by means of a very simple device, a teetotum, a top, or any arrangement capable of communicating a rotary motion, around an axis at right angles with its plane, to a disk of white cardboard one or two inches in diameter upon which fractions of concentric circumferences have been drawn in black, one of the halves of the disk being completely black, as shown in Fig. 1. As we show in Fig. 2, this disk may also be mounted upon Newton's classical apparatus and the experiment be performed in a continuous manner. Upon giving the disk a rotary motion whose angular velocity depends upon the age, visual acuteness, and especially the faculty of accommodation of the observer, it will appear to be covered with circumferences or fractions of concentric circumferences assuming all the colors of the rainbow, very faint, but sometimes appearing with a richness of tone that depends both upon the illumination of the disk and the spectral richness of the light that it receives.

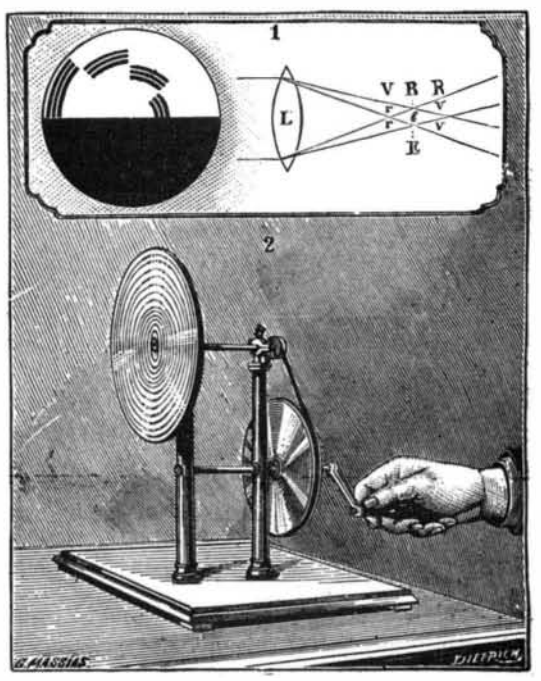
Mr. Macfarlane Gray explains the phenomenon as follows: Let L (Fig. 1) be the lens formed by the eye, the straight lines representing to an exaggerated degree (in order to facilitate the explanation) rays of different refrangibility. Let us suppose that the violet rays have their focus at V, and the red ones at R, and let us place the screen, E, at a constant distance from the lens. In order to obtain a sharp image of a violet colored object upon a black ground, it is necessary to diminish the convexity of the lens, to flatten it, so to speak, in order to bring to E the intersection of the violet rays occurring at V. Conversely, for the red rays the convexity of the lens must be increased in order to bring to E the red rays that cross each other at R.

White light may be divided into two groups of rays occupying the extremities of the visible spectrum, the red and the violet, and, supposing their refrangibility to be uniform, they will intersect each other respectively at the foci, R and V. The red and violet alone do not give white, but a combination of their respective groups does, and this suffices for the validity of the subsequent reasoning.

If the reader will please imagine that these rays are red and violet transparent screens producing white by their superposition, he will see that the screen will appear white at B, in the center of the lozenge formed by the rays. He will thus see that white light has not a definite focus like red and violet. The image of a white object upon a black ground will always extend beyond its real geometrical image to a degree equal to half the height of the lozenge at B. A white point upon a black ground will therefore occupy a wider surface upon the screen than a black point would occupy upon a white ground. This is the well known phenomenon of irradiation. When the violet is focused upon the screen, the violet objects are sharply defined without any marginal extension, but if at this instant a white point be substituted therefor, it will appear violet at the center and as if surrounded by a red aureola. In Fig. 1 the surfaces marked r are the red marginal rays and those marked v are the violet ones. The central lozenge intersected by the two groups is marked b. Here the light is white, and pure white at the center of the section. The network of lines may be assimilated to the well known toy soldiers mounted upon jointed strips of wood, but here the maneuvering is effected by a peculiar physiological action that the English call the "eye demon," but which we designate in France as the faculty of accommodation. It is this faculty that alters the convexity of the lens for producing upon the screen an image as perfect as the imperfect lens at its disposal permits.

This set forth, let us return to our top and call the two halves of the disk respectively the black half and the light half.

When the top spins, the accommodation is effected



ARTIFICIAL SPECTRUM.

FIG. 1.—Disk for obtaining the artificial spectrum, with explanatory diagram. FIG. 2.—Method of performing the experiment.

successively for the light and the black. After the black has been before the eye for a time, and this time is about a tenth of a second, seeing the rapidity of action of the accommodation, the joint of the network will be at E, the focus of the black. As the disk revolves in a direction contrary to that of the hands of a watch, the most peripheric white circular arcs will form their image with red margins resting upon the black lines and making them appear red. The accommodation acts, but with so much rapidity and energy that it exceeds the mark. After a rotation of 45 degrees, new white lines appear with yellow margins covering the black lines and making them appear yellow. After a new rotation of 45 degrees, the margins are greenish and the black lines appear green. After a rotation of 45 degrees, the margins are blue or violet and the black lines blue. The various colorations appearing upon the disk are due, as a last analysis, to the slowness or the haste of the accommodation in its endeavor to put the eye in focus at every instant. It is a semi-objective phenomenon. When the velocity of rotation of the disk is adapted to a given eye and synchronous with the speed of accommodation, the colors are well defined, but they become confused if the top spins too swiftly, the focusing not being effected quickly enough. The colors which disappear for a fatigued eye are still brilliant for a younger eye of which the accommodation is better. The apparatus, then, might, in a certain measure, let us remark by the way, play the role of an "accommodometer"

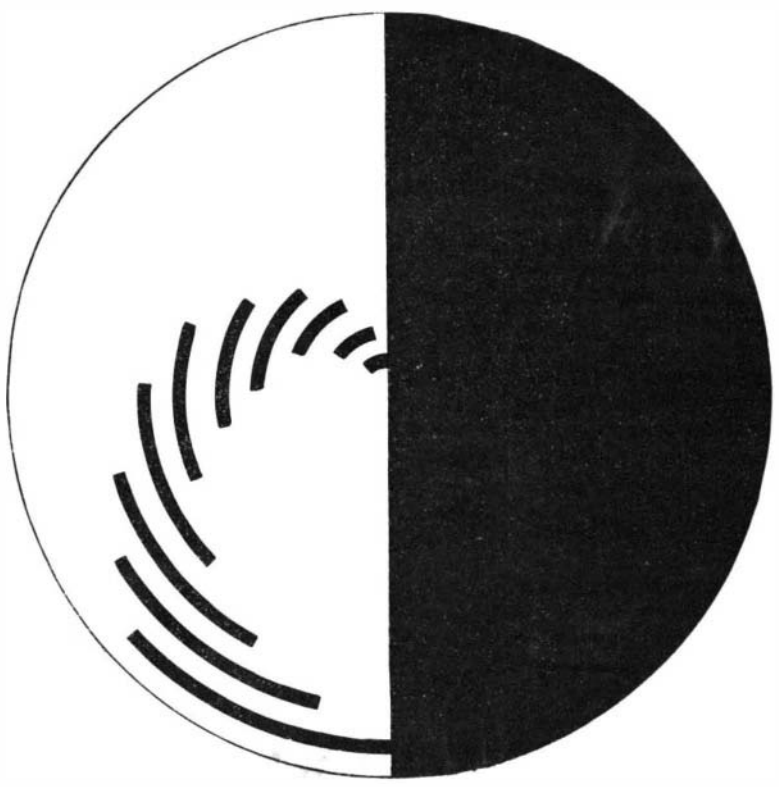


Fig. 3.

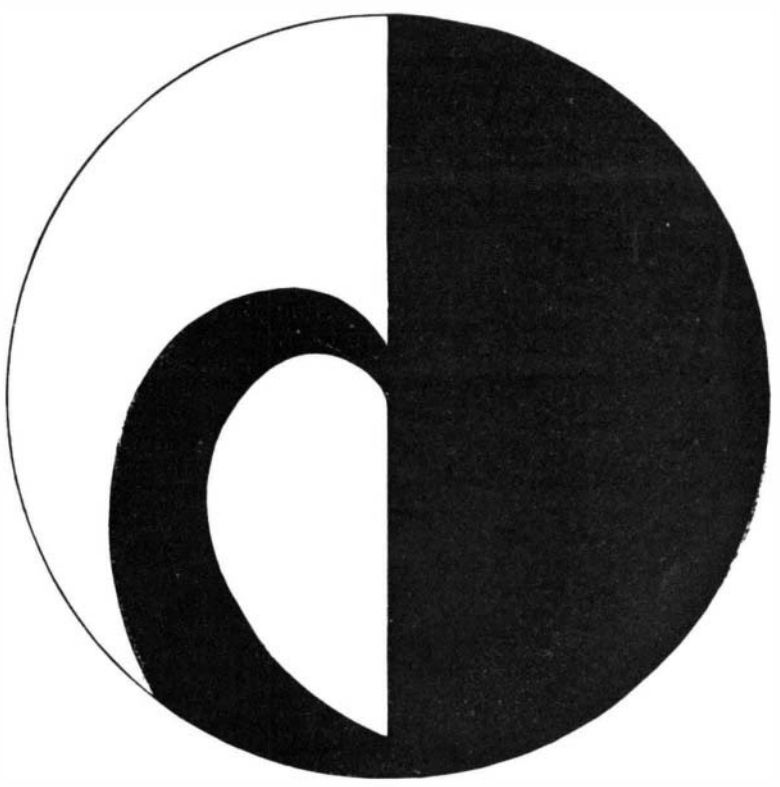


Fig. 4.

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by mounting the disk upon a proper sort of tachometer, the faculty of accommodation being connected with the appearance of the colors, and, consequently, with the angular velocity of the disk.

It is for simplifying the reasoning that the diagram is drawn for two series of rays solely. The intermediate colors in the same manner produce margins of intermediate colors that give yellow and green upon the intermediate bands.

The distribution of the colors evidently changes with the direction of rotation of the disk, and the exterior edges of the lines are fringed as were the interior edges in the opposite direction of rotation. Between the black masses and the white lines the margins of the white lines are red. Between the white masses and the white lines the margins of the latter are violet.

Such is the theory of the phenomenon as given by Mr. Gray. It does not, perhaps, present that degree of clearness and precision to which we are accustomed in the study of optics. The field remains open to investigators for varying the experiments and completing this first exposé.

We take the foregoing from La Nature, and subjoin two modified forms for the surface of the top, given by Mr. Charles E. Wolff, a correspondent of Engineering, who says, in a recent number of that publication:

When the top first appeared, I made an obvious modification (shown in Fig. 3) to try and obtain a more continuous spectrum. This was quite successful, as might be expected. The next step was to fill up the white lines, producing a continuous spiral band of black, as shown in Fig. 4, which gives a continuous spectrum.

Now, if we suppose the colors to be produced by a sort of chromatic irradiation of the white lines over the black, this latter form should have been a failure, which is not the case.

Instead of a top, any one may try this experiment by making diagrams like the above on cardboard and using a central pin to spin the same like a top.

Writing to Nature on the curious phenomena exhibited by the spectrum top, in which black and white markings give, when revolved, an impression of colors, Mr. Dawson Turner describes an arrangement constructed by Mr. T. J. Walls, of Edinburgh, by means of which the effects in question may be shown upon a screen to a large audience. The markings are painted on a disk of glass, placed in a projecting lantern, and revolved by a multiplying wheel. A great variety of effects are producible in this way by interposing colored glasses in the path of the beam of light. Thus, with a green glass, and in diffused gaslight, the dark marks appear mauve colored when suddenly stopped after rapid rotation, or when very slowly rotated, but become of a dark blue when the gas is turned off. On rotating the disk in the usual way, the lines upon it appear to be blue, green, and violet. With a blue glass in gaslight, the markings on the disk appear to be yellow when suddenly stopped, but a fine purple without diffused light. The colors given by the lines at a moderate rate of speed are red, gray, green, and blue. With a monochromatic red glass, the lines appear to be blue, gray, red, and dark red. The appearance of blue by red light is remarkable. Mr. Benham, the inventor of the top, thinks that the phenomena of color presented by it have nothing to do with the wave theory of light, but are purely subjective. It has been suggested that they are due to visual fatigue on the part of the observer.

The Treatment of Colds.

Now that the time of year has arrived in which extra precautions must be taken against contracting acute catarrhal inflammations of the respiratory tract, it may be well to inquire into some of the causes which lead to the production of these diseases, and the most efficient methods of treatment.

As the warm days approach, alternating as they frequently do with a brief cold spell, the habit of laying off winter clothing becomes seemingly imperative. The dust and germinating animalcules which float about in the air are active local irritants to the mucous membranes of the respiratory tract, and the two agents go hand in hand for the production of colds.

The relationship between a cold and influenza is not marked. We have been so accustomed to call every little cold "an attack of the grip" that we run great danger, therapeutically, of hitting wide of the mark. Grip is a distinct, emphatic disease, which, when one has it, he is not very apt to mistake for an ordinary cold; while if one thinks he has the grip, but is not quite certain of it, the malady is pretty sure to be the ordinary cold.

In the treatment of colds the danger lies not so much with the inflammatory condition itself as in the liability which arises from continued irritation or direct extension of the inflammatory conditions to lung structures. Many an incipient phthisis arises from a simple cold.

Once thoroughly inaugurated, these spring colds usually occupy about a week of time, with the aid of the various remedies employed. The dangers are that we overcrowd remedies without regard to the pathological conditions presented. We must bear in mind that the system must become accustomed to a new condition of affairs, and that great prudence is necessary in exposing one's self to outdoor temperature without sufficient protection.

It is possible in the early stage of a cold, especially when such is of the nasal variety, by thoroughly irrigating the nose twice a day with warm water in which a little borax has been placed, to abort an attack. No syringe is necessary; but by simply immersing the nose in a basin of water, and making forcible inspiratory and expiratory movements, holding the breath at the epiglottis, the nasal passages may be thoroughly irrigated. Of course there are advantages in the syringe, which may be preferable from the standpoint of neatness.

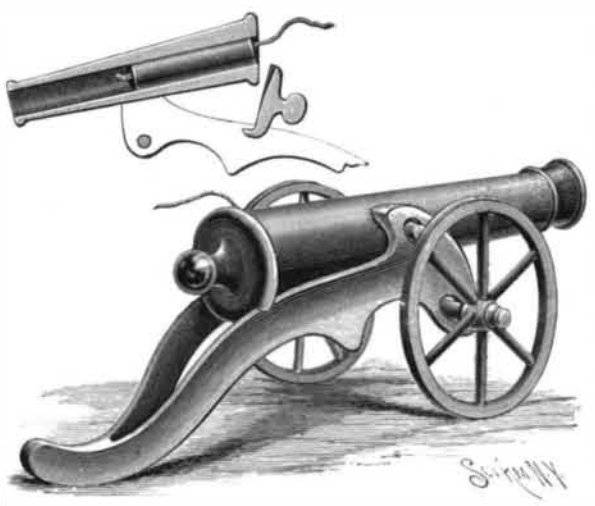
Aconite holds an excellent place in aborting colds, but care must be taken in its employment that fresh colds are not contracted. The dose usually employed should be a drop an hour, or half hour, as the severity of the case requires, which should be maintained until free perspiration results.

Quinine may also be employed, as well as the coal tar derivatives, but these are not as efficient as a well directed course of treatment by aconite.—Times and Register.

A CANNON TO BE LOADED WITH FIRE CRACKERS.

The illustration represents a breech-loading toy cannon in which a fire cracker is used for the load, the fuse or stem of the cracker being carried upward in a channel of the breech block for lighting, to explode the charge. The improvement has been patented by Mr. Milton J. Shimer, of Freemansburg, Pa. The cheeks of the carriage stock are curved inwardly, and have slots which receive the trunnions of the cannon.

At the rear of the cheek extensions a breech block is formed which may be integral with the carriage or attached to it in any suitable manner. The cannon may be inclined to carry its breech upward to facilitate loading, as shown in the small view, but without being disconnected from the carriage, as the muzzle cannot be carried sufficiently downward and rearward to admit of the trunnions being displaced from their bearings.



SHIMER'S TOY CANNON.

An Inconsistent Policy.

The short-sighted and inconsistent policy which seeks to close to young men all entrance to the trades, and at the same time allows, without protest, the great influx of foreign workmen, needs little comment. It is intrinsically selfish and unnatural, and being such cannot long continue. The trade school has come to stay. It has come in answer to a great need, and must develop in answer to that need. The right of American youths to enter the trades, and to equip themselves in the most economical manner for a livelihood, cannot much longer be gainsaid or set aside. What might, under other conditions, become the tyranny of a class cannot long exist beside the free institutions of our country. On the contrary, the true interests of organized labor are to be found, not in futile opposition, but in active participation. The opportunity is at hand for the labor organizations of the country to actively influence and, to a certain extent, direct the trade school movement. By co-operation with the schools they can do much to realize the highest opportunity for usefulness that is open to them. By selfish and bigoted opposition they will do much to cripple and narrow their own power. A comprehensive system of trade training suited to the times would involve the recognition of the trade school graduate by the trade organizations of the journeymen, as well as of the masters, and his establishment with a definite place and a definite economic value in the industrial world. Such a system, while effectively preventing the admission of imperfectly trained workmen, would afford ample opportunity to every naturally qualified candidate. An arrangement of this kind would open the doors of the trades to American youth, without requiring the sacrifice of all opportunity for culture that is now demanded. Such an arrangement would mean to a large extent the Americanizing of the trades—it would mean the addition to our industrial army of young men who have had the opportunity of a good public school education, and who are fitted to assume the duties of citizenship with intelligence and patriotism, as well as to attain to the highest efficiency in the operation of labor.—Sanitary Plumber.

How to Fight Microbes.

A writer in the Evening Telegram very truthfully says that water, air, and sunshine are the best sanitary agents.

Within a few days the warm rays of the sun will begin their work of penetrating into the secret corners of the back yards and alleys where the snow and ice have kept in check for four or five months the disease-breeding bacilli, and the work of freeing the millions of disease microbes which have lain dormant for so long will have been fairly launched.

Water and air are the greatest sanitary agents. The germs of many of the worst diseases are conveyed in drinking water, and it, therefore, becomes a duty to use pure water only. Fresh air is something we all may obtain without money and without price. Sunshine is easy to obtain under most circumstances. There is nothing which will kill disease germs so quickly as the application of fresh air and the rays of the sun. Although the germs of most diseases may be frozen solid during the winter, without resulting in their destruction, hot water will kill them under ordinary circumstances.

Water can be rendered perfectly pure and safe by boiling and filtering. It is dangerous to drink water which has stood overnight in a closed room, especially in a room which has been occupied by persons or other living animals. Not only should the body be bathed systematically, but every nook and corner of the house, of the cellar, and the door yard should be closely scrutinized at this time of the year, and every particle of dirt of whatever character removed. It is impossible to tell how many microbes of disease may be lurking in a handful of dirt found in the corner of the woodshed or in the cellar or under the disappearing ice and snow in the yard.

Disinfectants should be used freely in all suspicious places, but even the best disinfectants will not purify the air without the aid of the sunshine, wherever it is possible to give the latter access. Copperas is a good and cheap disinfectant for many purposes. It is easy to obtain, and readily dissolves in warm or cold water. It should be used in the proportion of two pounds to the pailful of water.

Chloride of zinc is superior to copperas as a disinfectant, but is more expensive, and therefore not so available when large quantities are required. The proportion is half a pound to the gallon. This is a very effective solution to use in kitchen sinks, house drains, etc.; also in vessels used about the sick room. Corrosive sublimate in a solution consisting of one part of the salt to a thousand parts of water is one of the most effective disinfectants known. It is a poison and should be handled with great care. Quicklime and chloride of lime are valuable to scatter around wet places, under buildings, in stables, etc. A solution of sulphate of zinc, one pound; carbolic acid, two ounces; and water, four gallons, answers every purpose for washing soiled clothing taken from a sick room. After washing the bed linen and other clothing in this a thorough boiling will destroy all disease germs.

Fumigation will reach every corner where germs of disease are apt to lurk. The best thing to burn for this purpose, as well as the cheapest, is sulphur. But fumigation is not worth much unless all the windows, fireplaces, flues, keyholes, doors, and other openings are securely closed by having strips of paper pasted over them.

How to Find the Horse Power Expended in Climbing a Hill With a Bicycle.

An experiment which may be performed by any one riding a bicycle is the determination of the horse power of the rider, by a simple calculation after the ascent of a hill. The mechanical equivalent of a horse power, being 33,000 pounds raised through a distance of one foot in one minute, may be directly applied to a machine and its rider. The only requirements besides a man and wheel are a stop watch and a steep, smooth hill of known altitude. The hill should be steep enough to prevent one from ascending with any great velocity, and thus have the wind resistance vitiate the result. The weight in pounds of machine and rider being almost always known and the time readily taken, the altitude of the hill can be found by a level and staff. It will be seen that the length of the hill does not matter, so long as the incline is steep enough to prevent fast riding when the whole energy of the man is expended in propelling him up the grade. The figures found, when compared with the ones above, give the horse power in a pretty accurate way.

N. MONROE HOPKINS.

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