AN INSTANTANEOUS LIFE PRESERVING RAFT.

The history of recent marine catastrophes, such as those of the Atlantic, Northfleet, and Ville du Havre, prove that vessels, after becoming severely injured, generally sink within half an hour. The unavoidable confusion which follows the occurrence of a sudden disaster renders such means of safety as the boats, which require care and some time to launch, of little value; but, on the other hand, devices which may be instantaneously set afloat, such as light rafts, would, if properly disposed about a vessel, be of the greatest efficiency in saving life. There are certain requirements, however, which such apparatus must meet in order to be of sure utility in the time of need, and which may be summed up as follows: They must be of sufficient capacity to support, say, from 400 to 600 persons, so located as to necessitate no alterations in the vessel or so as to interfere with her management, perfectly accessible, and, finally, so applied to the side of the ship as, when afloat, to be readily reached by the passengers.

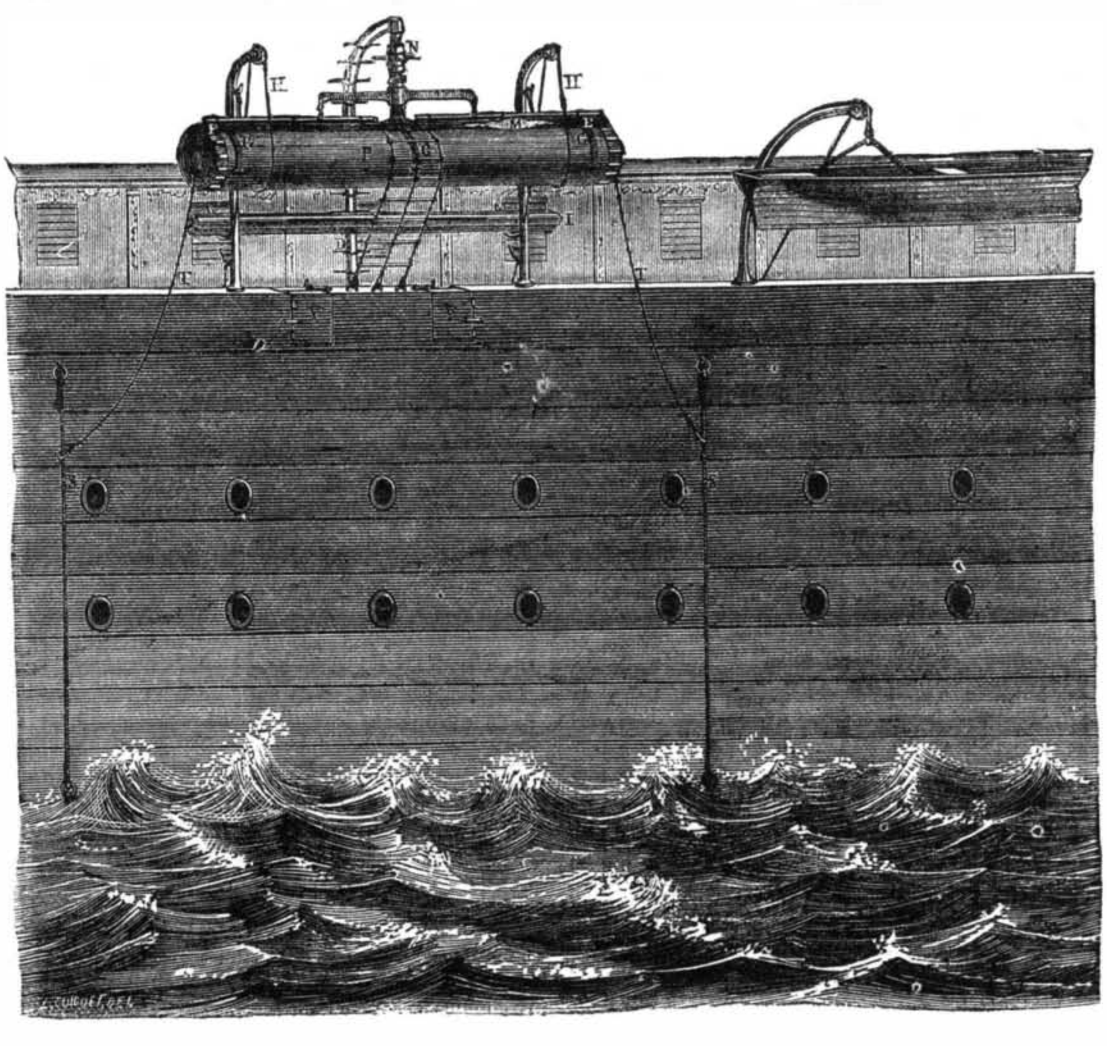
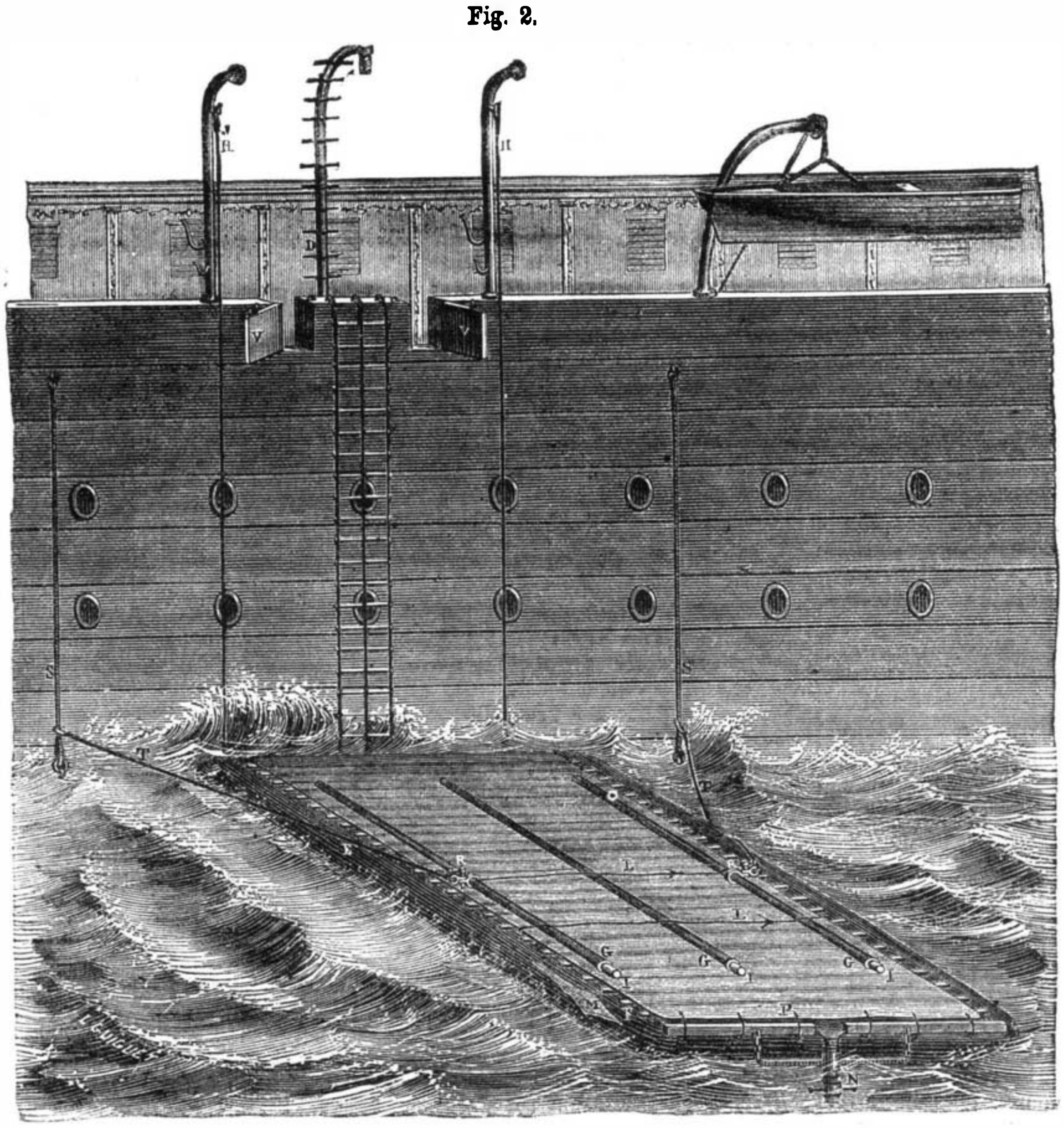


Fig. 1.—INSTANTANEOUS LIFE PRESERVING RAFT.

In the illustrations herewith given is represented a new form of "instantaneous raft," which appears to be of considerable value, judging from its general design, and which may be arranged in connection with steamers of the largest size. Our engravings are drawn to the proportions of the Ville de Paris and Pereire, both transatlantic steamers of heavy tunnage.

Fig. 1 shows the apparatus hanging from its davits, ready for use, and Fig. 2, the same afloat. A reservoir of strong sheet iron, containing 106 cubic feet of air compressed to 15 atmospheres, is placed in the engine room, and kept always charged by means of the pump ordinarily used by divers in descending to repair the bottom or screw. Tubes pass through an expansion chamber, which is three fourths full of water, and discharge the air into the same through perforations in their sides, the blast finally escaping through a heavy iron pipe. The latter will be seen in the illustrations between the davits, as it extends up through the deck. It is filled with several cleats to allow of access to its outer extremity. This pipe, together with the reservoir and the expansion chamber, are carefully tarred inside or lined with rubber, so as to preclude any possible leakage. The column, D, is united by means of a strong screw sleeve, N, to the insufflation tube of a huge air mattress, M (length 26 feet, width 23 feet, and thickness 20 inches), which is contained rolled up in an envelope, E (Fig. 1), and suspended like a boat above the bulwarks. F F, Fig. 2, are strips of wood secured transversely across the upper side of the mattress, above which, again, is attached a cover or deck, P, of heavy canvas. To the latter is longitudinally secured three flexible tubes, G, Fig. 2.

Fig. 2.



When the command is given to lower the raft, the crew, of about a dozen men, cast loose the cords, H, thus allowing the mattress to unroll and hang (by the screw sleeve, N,) alongside the ship. While in this position, heavy iron rods are pushed into the tubes, G, thus holding the apparatus extended. A turn or two of the handles on the screw connection, N, admits the air from pipe, D, which speedily inflates the mattress. Another turn closes the connection and confines the air, and one more twist disengages the screws, when the raft drops into the water. Here it is held by wire ropes, J, which are secured to rings which travel on the vertical stationary guys, S, thus retaining the raft close up to the ship's side. In the rail are made two ports, V, which afford access to the Jacob's ladder leading down to the raft. The latter is finally set adrift, after being manned, by removing the pegs, R, which connect it with the cords, T. The *Revue Industrielle*, to which journal we are indebted for our engravings, states that the device has been practically tested with considerable success. At the present day, when losses of ocean steamers are more than usually prevalent, such inventions are of especial and timely importance.

Full investigation of the merits of such devices, and practical trials of the same, are among the most imperative duties of the owners of steamships.

Wilde's Electric Light.

The Comet, a British gunboat, has lately been fitted with one of Wilde's electric lights, which operates with great success. A recent trial showed that its power was immense, and that no boat could approach the light within a mile without being discovered. In a boat at 2,000 yards distance from the Comet, and with the beam of light brought to bear upon the bat, the *Times* newspaper could be read with the greatest ease.

Mr. Wilde's apparatus consists of two parts—an electro-magnetic induction machine for producing the electricity, and an arrangement for regulating the light produced by the current, and projecting it upon distant objects.

The electro-magnetic induction is founded upon a new andsomewhat paradoxical principle discovered by Mr. Wilde—that magnets and electric currents indefinitely weak can produce magnets and currents of indefinite strength. The machine consists of a circular or cylindrical framing of cast iron, round the interior of which are arranged a number of electro magnets at equal angular distances from each other. A cast iron disk is mounted on a driving shaft running in bearings fitted to each side of the framing, and carries a number of armatures revolving before the electro magnets. A slight charge of magnetism is imparted to the electro-magnets before the machine is used for the first time, by transmitting a momentary current through the wires surrounding the iron cores, or by touching their extremities with the poles of a permanent magnet. This initial charge is always retained by the electro-magnets, and is the basis of the augmentations of the electricity and magnetism produced by the rotations of the armatures. As the armatures revolve, they become slightly magnetized in their passages between the poles of the electro-magnets, generating weak currents in the insulated wires surrounding them. These currents are transmitted, by means of a commutator, through the wires surrounding the electro-magnets, so as to increase their magnetism until, by a series of actions and reactions of the armatures and electro-magnets on each other, the magnetism is exalted to the highest degree of intensity, and the most powerful currents of electricity are produced. A small fraction of the current thus produced is sufficient to sustain the power of the electro-magnets, while the major portion of the current produces the light. The machine on board the Comet is 28 inches high 34 inches in length, and 21 inches in diameter. Its weight is 11 cwt. About four horse power is required to drive it at a velocity of 600 revolutions per minute, and this driving power is obtained on board the Comet from the fly wheel of the small engine that raises and lowers the eighteen tun gun and its platform. At this velocity the current will fuse an iron wire 6 feet long and 0 05 inch in diameter, and will burn carbons half an inch square. In this machine the alternating current is used for producing the light, past experience in lighthouse illumination having proved it to be greatly superior to the direct or continuous current, since it has the important advantage of consuming the carbons equally, and thus always retains the luminous point in the focus of the optical apparatus used in connection with the machine. The alternating current also dispenses with commutators, and the destructive spark on the rubbing surfaces is also avoided when the light may be accidentally extinguished, or when the circuit becomes broken from any other cause. Copper wire conductors are laid from the machine along the Comet's deck, from the position of the machine over the engine room to the fore part of the vessel, for the transmission of the electric current to the apparatus where the light is regulated and projected from. All the arrangements on board the Comet, in this respect, have been made to render the light available for naval purposes, whether as a torpedo boat detector or otherwise, and with this view a simple mechanical regulator arrangement, worked by the hand, has been substituted for the delicate mechanism by which the carbon poles have hitherto been automatically adjusted. The carbons, as they consume, are made to approach each other by means of a right and a left handed screw, the screws being made to act independently of each other, so as to allow of the adjustment of the carbons to the focus of the optical apparatus used for projecting the light. The regulator, with its carbon points, is placed in the focus of a catadioptric lens, which parallelizes the divergent rays of the light into a single beam of great intensity. The lens, with the regulator, is pivoted horizontally and vertically on the top of a short iron column fixed on the forecastle bulwarks of the Comet. The box holding the lens and regulator with the carbons is thus well elevated above the bows of the vessel, and the beam of light, by the action of a quick screw adjustment, may be directed to every part of the horizon, and cover any object within the vertical angle of its range. As the carbons only require regulating once in two or three minutes, this is effected by the man in charge without any interruption in the movements for directing the beam of light.

Mr. Wilde, in his official communications with the Admiralty, has estimated the cost of producing the light from his machine on board the Comet, exclusive of the driving power obtained from the vessel's engine room, at only 4d. per hour.

JAMES BOGARDUS.

Mr. James Bogardus, an inventor celebrated both for the multiplicity and variety as well as the value of his productions, recently died in this city in the 75th year of his age. The record of his life is one of continuous labors repeatedly crowned with substantial success, of a versatile genius which devoted itself to the origination of devices in widely differing arts and industries, and finally of unremitting toil in the search for the new and useful, pursued even to the day of his death.

Born in the first year of this century, at Catskill, N. Y., Mr. Bogardus quite early in life developed a strong taste for invention, and while still a young man obtained the highest premium for an eight day, three wheel chronometer clock; subsequently he devised a complicated time piece without dial wheels. In 1828, however, he produced his first generally useful invention, the "ring flyer," still largely employed in cotton-spinning machinery; this was followed by an excellent form of sugar grinding mill, also now in use. The steel die of the first gold medal of the American Institute was cut by an engraving machine invented by Mr. Bogardus in 1831, about the time of his production of the transfer machine, now everywhere employed for printing bank notes from separate dies. In the following year he invented the first dry gas meter, and then modified his plans so as to produce an apparatus, for the same purpose, of totally different construction. In 1833 he patented a pencil case of ingeniously novel design. Being in England in 1836, he answered a challenge in the public prints by inventing an engraving machine which made not only an accurate facsimile of the head of Ariadne on a medal, but also engraved from the medal comic facial expressions. This device was followed by an engine-turning machine, and in 1839 by his winning a prize of $2,000, over 3,000 competitors, for the best machine for making postage stamps. Mr. Bogardus' plan for the erection of iron edifices, as shown in his own factory at the corner of Center and Duane streets in this city, has been largely adopted throughout the country.

The inventions of this remarkable man realized for him a large fortune, but the accession to wealth seemed to offer no inducement for him to remit his exertions. He was devising an apparatus for deep sea sounding at the time of his death.

PREVENTION IN PLACE OF CURE.

President Barnard, in his late address before the Health Association on the occasion of its meeting in this city, intimated that the advance of modern science was such that the physician would eventually find his occupation gone. The people would, it was considered, as they advanced further in knowledge of natural laws, become more and more able to dispense with the doctor, and in brief would learn so to apply the "ounce of prevention" as to obviate the necessity of the "pound of cure." We do not agree in the view that the physician will ever become a useless member of society, for the simple reason that, instead of decreasing the share of his duties, the culture of preventive medicine—of the knowledge of how to prevent diseases as well as to cure them after they are engendered—must tend to amplify and enlarge the same. His will be the task, not merely to recognize the forms of ills and endeavor to combat their effects, but to look into the future and, through the aid of circumstances of the present, predict possible evils and point out means of defense. Add to this the constantly increasing knowledge of drugs and their properties, of the wonderful relations of mind and body, of the nature and habits of disease, which Science is rapidly developing, and the physician of the future has before him not a narrower but a far wider field for the exercise of his skill.

"Preventive medicine," says Dr. Henry Bowditch, in an an admirable and exhaustive paper on the subject, which we find in the fifth annual report of the State of Massachusetts, "is the natural outgrowth of modern thought and resources, stimulated by centuries of suffering and by the sacrifice of multitudes of human beings." The various lessons given us by Nature as to the possibility of checking or preventing disease have culminated in the fact that the State uses its moral power and material resources toward preserving the health of its citizens. As to how far the State may thus exercise authority, there is a difference of opinion; but the views expressed in the paper before us (pointing out that the neglect of a city government to provide proper sewerage and the course of a common drunkard, both tending to disturb the public peace and the comfort of individuals, are alike crimes and should be considered as such in law), seem fraught with a deal of sound sense. The existence of vile deposits which overwhelm the inhabitants with a tainted atmosphere or the spread of a habit which strikes at the root of the physical, moral, and intellectual health of the people, are both producers of disease to the community which should be as sedulously guarded against as the visitation of a fever to the individual, and the means used to defend the people from their ravages are striking examples of pure preventive medicine.

In considering the best chances of a person having a tendency to consumption arriving at a good old age after a life of health, Dr. Bowditch discusses a few general topics and lays down a number of plain rules for sanitary guidance, which are mainly generally applicable to every one. Under the subdivision of residence, the first point urged is that the cellar should be always dry. No possibility should exist of drinking water becoming contaminated by refuse; and hence for the latter, closely cemented stone, brick or vitrified tile drains should be used, while the supply for drinking should be brought to the house from some distant spring or pond. The dwelling is best located on an elevated knoll, open to the south and west winds, but somewhat shielded from the north and east. There should be means of allowing sunlight to enter every room. As regards temperature, about 70° as a medium is the best, and this heat should be derived from open fire places connected with well constructed chimneys in every room.

With reference to clothing, the writer condemns sudden changes made in the spring of the year, and points out the well known objections to thin soled shoes, tight lacing, and low dresses. Bathing is recommended in moderation as a check to consumptive tendencies. Surf bathing, however, should be cautiously indulged in by all predisposed to pulmonary difficulties.

Dr. Bowditch condemns very strongly the neglect of recreation common to Americans. Children naturally weak should be compelled to play in the open air, and business men should make it a rule to leave work for a certain period each day and devote the same to exercise or other relaxation. In matters of education among people showing the slightest tendency toward consumption, it should be a steadfast law that the mind should be wholly subservient to the body's welfare.

The various kinds of physical exercise are considered by Dr. Bowditch in some detail. Walking, he believes, is the best form, and most generally applicable. It exercises the body better than any other method. The most favorable time is about midday in winter and in the morning and toward evening in summer. Late in the evening is less useful be cause of the liability to dampness and coldness in the absence of the sun's rays. Fast running, in the opinion of the writer, is pernicious to consumptives; it produces violent motions of the heart and too rapid breathing, and consequently great tendency of blood to the lungs. As regards dancing, it is said that, at appropriate hours and for a proper length of time, nothing can be better. It promotes grace and ease of motion and positive health, if used thus properly. Horseback exercise for consumptives is excellent, and in fact a remedy for the disease at its inception. An easy pacing or galloping horse is better than a hard, square, solid trotter, as the latter is apt to cause pains in the chest and undue fatigue. Driving for health should be in an open carriage; the back should never be rolled up while the sides are erect, because the draft thereby produced will be liable to cause a cold and consequent injury to the lungs.

Gymnastics, while increasing the power of the muscles, are of little advantage in warding off phthisis. Many stalwart gymnasts have been victims to consumption. The swinging of heavy clubs about the head cannot be recommended. Less exercise than that with the arms causes hœmorrhage in those consumptively inclined. Boxing puts almost too much strain on the heart and lungs, and it is questionable whether severe blows on the chest are ever of use. Bowling should be avoided by consumptives. Rowing tends to expand the chest, and, if no racing be undertaken, may prove of great value. Swimming should be used with great caution, as too long a stop in the water is apt by itself to bring on consumption.

Dr. Bowditch, in conclusion, says that if these recommendations, with others that might be added by any family physician, could be thoroughly carried out by the patient during childhood, and by the man or woman when arrived at adult life, many that will now die of consumption would escape that calamity.

Correspondence.

The Analyzing Power of the Spectroscope.

To the Editor of the Scientific American:

The science of spectrum analysis is not yet a hundred years old, but the results obtained in this short time are surprising. The grandest principle evolved is, the uniformity of the elements composing the universe. The earths, metals, and gases, of which the planet on which we live is made up, have been found to be present in the sun and the fixed stars, and some of them also in nebulæ and comets. By analysis of sunlight, several new metals have been discovered, whose presence in our world was not theretofore known. Some connection has also been found to exist between the spots and glowing gas streams of the sun and electrical phenomena; although the subject has not been sufficiently studied for the laws governing this relation to be definitely established. When we think that, for many thousands of years, Nature has set the rainbow in the heavens, as a constantly recurring hint of the great laws of the light shut up in the tiny globules of water, it seems strange that man did not sooner grasp at some of this half concealed knowledge. But it is not of the results of spectrum analysis of which I wish to speak, but of the minute analyzing powers of the instrument itself.

The most interesting of these is the power of indicating the size, shape, and motion of the gas flames of the sun. From time to time, streams of glowing gas shoot out from the surface of the sun, to the hight sometimes of one hundred thousand miles, and with a rapidity of one hundred miles or more in a second of time. They may have also a lateral motion, and develope into the most fantastic shapes. It is possible to measure with accuracy these swift twistings and turnings, to draw their contours, and to note not only the rate of velocity but also the angles which they make with the surface of the sun.

Another interesting power of this instrument is that of denoting the presence of extremely minute quantities of substances. The most common of all known substances is sodium, the base of common salt. Indeed so universally distribnted is it that great difficulty is experienced in obtaining a spectrum without the characteristic lines of this metal. It will not be wondered at when we learn that the spectroscope will demonstrate the presence of so small a quantity as one fourteen millionth of a milligramme, or $\frac{1}{14000000000}$ of a gramme.

There are three other metals of which the spectroscope has the susceptibility of demonstrating even smaller quantities, namely, lithium, thallium, and stronthium, the visible quantities being one forty, eighty, and one hundred millionths of a milligramme respectively.

It must not be supposed that the instrument is employed only in astronomical and chemical science. In many mechanical arts, it has become useful, as for instance in the preparation of dyes. It comes to the assistance of the public analyzer in testing the purity of wine, beer, cheese, butter, etc. It has opened an important field of research to the physician, diagnosing for him the condition of the tissues and fluids of the human body. It is moreover an aid in the administration of justice, in detecting the presence of blood or of poison.

In conclusion, let me give, as an illustration of its accurate and minute power, the examination of human blood. Blood may be burned, treated with acid, dried or washed or kept for an indefinite period of time, and yet this instrument will detect the presence of the constituents of the blood in the substance that remains.

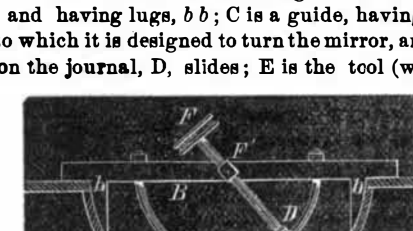
Moreover the fresh blood globules are so minute that, if three thousand of them be placed in a row, they will measure barely an inch in length: yet one half of one of these globules or one six-thousandth of an inch of blood, may be detected by the spectroscope. S. H. C., M. D.

Polishing a Parabolic Mirror.

To the Editor of the Scientific American:

Having read with much interest, in your recent issues, an account of a proposed plan for constructing a mammoth telescope, and having heard it stated that it would be a difficult matter to turn and polish a parabolic mirror of a large size, I inclose a drawing of a device which suggests itself to me as adapted to the requirements of the case; and I think it should be brought to the notice of any parties contemplating the erection of such a telescope:

A is the mirror, B a bar, extending across the top of the mirror and having lugs, *b b*; C is a guide, having the exact curve to which it is designed to turn the mirror, and on which a lug, on the journal, D, slides; E is the tool (which is de-



tachable), from which the shaft extends upwards through the journal, D, above which there is a collar. F is a pulley, from which the shaft receives its motion, the belt running at right angles to the plane of action of the shaft; F' is a journal, turning in a socket in the bar.

It is clear that, by imparting to the shaft a high velocity, and then rocking it slowly from side to side, at the same time slowly revolving the mirror, the whole of the surface will be traversed by the tool, and will have the exact curve of the guide, C. Probably the best mode of imparting the oscillating motion to the shaft would be by extending it above the pulley, attaching a pivoted rod at the top, and operating it by hand. WM. B. COOPER.

Philadelphia, Pa.

WE see, in the London *Building News*, that it is proposed to construct a railway from Naples to the crater of Mount Vesuvius. The journey will be made in an hour and a quarter, and the line is to cost six or eight hundred thousand dollars. One of the promoters is said "to be enabled, by his study of the subject, to guarantee the safety of the passengers in the event of an eruption."