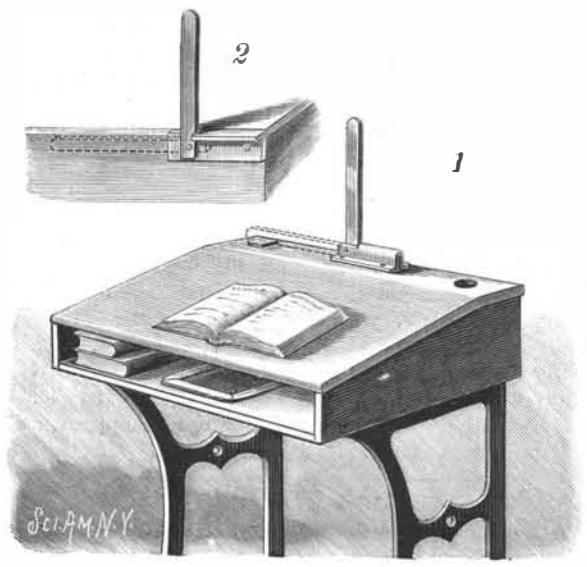
A DESK SIGNAL FOR SCHOOLS.

A simple and effective signal, to be used by scholars in schools, for attracting the attention of the teacher, is illustrated herewith, and has been patented by Mr. James C. Parker, of Woodston, Kansas. A signal arm is pivoted in a plate doubled on itself, and having



PARKER'S DESK SIGNAL.

flanges for attachment to the desk top, a part of the plate being cut away to admit the arm between its folds, and to form a shoulder for stopping the arm after it has passed a vertical position, the arm turning on a pivotal pin. Fig. 2 shows a form of signal to be placed against the front or end of the desk, the supporting plate being L-shaped in section. To give a signal, the scholar lifts the arm from the position shown in dotted lines into the position shown in full lines.

MICROSCOPICAL NOTES.

At the meeting of the Microscopical Section of the Brooklyn Institute, which occurred on the 15th of October, "Circulation in Animal and Vegetable Tissues" was the subject for the evening. It will be impossible within the limit of an ordinary article to minutely describe all the objects exhibited. Among vegetable organisms, the circulation of the sap in the nitella was shown, also the circulation in the beautiful desmid colosterium.

Among animal organisms was shown the circulation in the daphnia, or water flea, the minute heart being made clearly visible by the transparency of the shell of this little creature. The circulation of blood in a frog's foot was shown by Mr. Stephen Helm, by stretching the foot so as to distend the web, as shown in Fig. 1. Mr. Helm's apparatus consisted of a thin, apertured piece of wood, provided with a glass slide upon which to rest the frog's foot. Mr. Caleph suggested the use of a piece of cork for this purpose, omitting the glass slide.

We illustrate this frog plate, as it is the simplest that has as yet come to our notice. The plate consists of a slice of cork, with a hole near one end corresponding with the hole in the stage of the microscope. The frog is wrapped in a wet cloth and held in place upon the cork by means of a small rubber band. One of the frog's legs is extended. To two or three of the toes are attached threads which are held under tension by ordinary pins stuck into the cork. The foot is moistened to render the web more transparent, and the circulation is observed with a three-fourth or one inch objective.

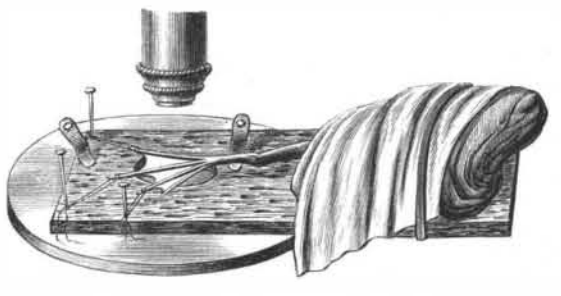


Fig. 1.—SIMPLE FROG PLATE.

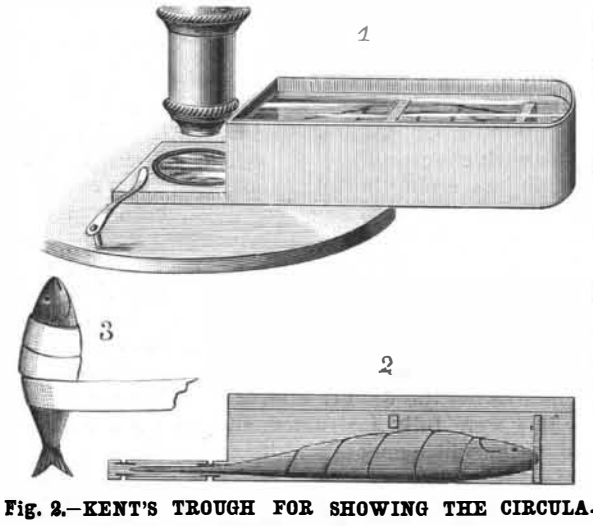


Fig. 2.—KENT'S TROUGH FOR SHOWING THE CIRCULATION OF BLOOD IN A FISH'S TAIL.

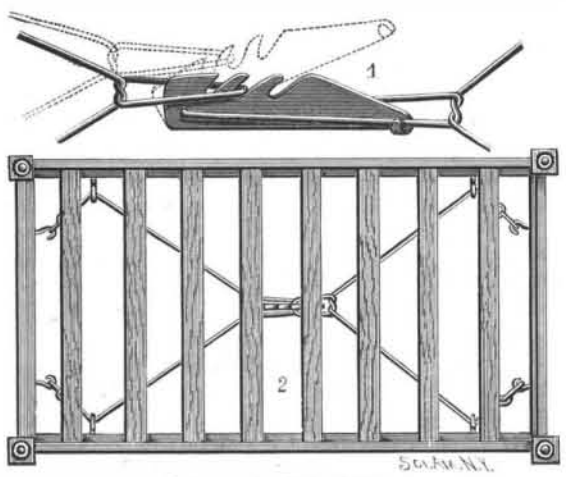
The president of the section exhibited the circulation of blood in the tail of a goldfish. This exhibit required more complicated apparatus, which consisted of a metallic tank provided with a thin extension, having in its upper and lower sides glass windows, formed of cover glasses set in recesses and secured by marine glue. The fish was wrapped in a strip of thin muslin, to deprive it of the use of its fins. It was laid upon its side in the tank, as shown in Fig. 2, with its tail between the two windows, allowing the light to pass upward through the tissues from the mirror of the instrument. The tank is filled with water, and, to prevent the fish from jumping, small wooden cross bars are placed in different positions in the tank. Arranged in this way, ths fish may be observed for about twenty minutes. The blood is seen flowing in crimson streams in various directions through the tissues of the tail. An inch or three-quarter inch objective is ample for this purpose.

The blood of the frog is white, and the corpuscles are larger than those of the fish, but, as compared with the corpuscles of human blood, those of the fish are larger.

G. M. H.

AN IMPROVED BED STAY.

A simple and inexpensive stay for bedsteads, to brace them against racking strains, is illustrated herewith, and has been patented by Mr. Cade Bethea, of Mobile, Texas. Two mainstay wires are doubled at their center parts, and twisted a turn or two to form a long loop on one and a shorter loop on the other, the ends from one loop diverging toward the head board and side rails, while those from the other loop diverge toward the foot board and side rails. Each wire passes through eyes or staples fixed in the side rails, and its



BETHEA'S BED STAY.

extremity is connected to hooks, eyes, or staples in the head or foot board. A locking device, shown in the small figure, is fulcrumed on the end of the long loop of one of the stay wires, this device having a laterally bent hook or lip at one end to catch under one side of the stay loop, and having one or more notches in one edge, whereby the mainstay wires may be drawn or strained up tightly, in the manner indicated by the dotted lines. By this means the corner posts are held firmly to the head and foot boards and the opposite side rails, and the latter are also drawn tightly to the ends of the bed slats.

Dr. Schliemann's Excavations at Mycenæ.

The excavations commenced by Dr. Schliemann at Mycenæ are still being energetically carried on, and continue every day to bring to light fresh objects of great archæological and anthropological interest. The entire terrain around the town is full of tombs belonging to an epoch antecedent to Homer. These pre-Homeric sepulchers are cut in the solid rock and carefully formed in regular compartments, with an area of from thirty-five to forty square meters. In these chambers the dead were laid without being covered with earth, nor were they cremated, as at the time of Homer. Among the numerous objects discovered at Mycenæ in the course of the latest diggings are articles of glass, crystal, and ivory, besides precious stones with engravings of animals charmingly executed, the whole treatment being Oriental in character.

Delivery of Pipes.

A cylindrical pipe, flowing full, discharges less than the same pipe when only filled through a segment whose arc is 281 deg. 30 min. by 2·5 per cent, while the velocity is less by 9·5 per cent, the hydraulic inclination being the same. The full section discharges less, and also with less velocity, in other forms of pipes as well as in cylindrical. The scouring power of circular pipes flowing full is therefore less by nearly 10 per cent than that of the same pipes filled through an arc of 281 deg. 30 min.—a new element to be considered in the arguments for and against circular pipe sewers.

AN IMPROVED GIG SADDLE.

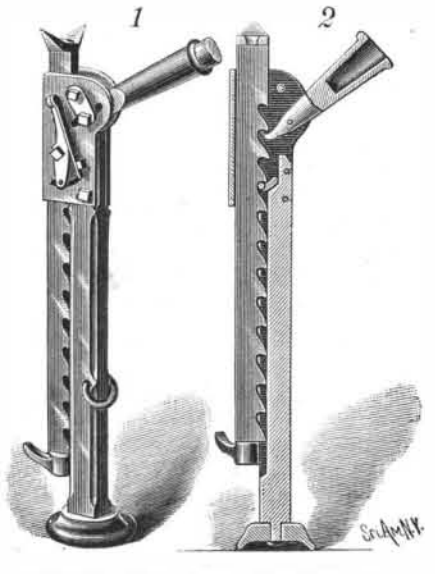
A construction of gig saddle, with the attachment of the tug straps thereto, whereby the saddle is kept from material movement on the back of the horse, and there is less wear and tear upon the saddle, is illustrated herewith, and has been patented by Mr. Marcellus

HITT'S GIG SADDLE.

M. Hitt, of Luray, Va. The pad, skirts, and saddle tree are of the usual construction, the tug straps being fastened at their upper ends by the terrets, while the lower end of each tug strap is securely fastened to the skirt to hold a buckle or ring, the end of the strap being folded under and secured to the skirt by rivets. The thill loop has at its upper end a snap hook by which it is connected to the ring held on the lower end of the tug strap, permitting the thill loop to be readily attached and detached from the harness, so that the loop may remain on the thills. This obviates the necessity of slipping the thills through the loops in hitching up, or when the thill is through the loop on one side, the other side can be detached and slipped on the thill without moving the horse or vehicle. With this construction the saddle is held in perpendicular position while the horse is in motion, the only movement being from the snap hook to the thill, as shown in dotted lines.

AN IMPROVED JACK.

A simple form of jack, by means of which a hold or purchase may be obtained on a log where but limited space is available, is illustrated herewith, and has been patented by Mr. Leroy O. Lander, of Tacoma, Washington Ter. The body of the jack has a concaved base, and a guide groove for the lifting bar, which is held to the body by a strap or casing, one of the bolts by which this casing is held to the body affording a pivot for the two links which carry the operating lever of the jack, a bolt connecting the links and lever, the bolt working in guide slots formed in the casing. The toe of the operating lever engages the teeth of the lifting bar as shown in the sectional view, Fig. 2. The spring dog engaging the lifting bar is pivoted to the outer face of the casing, the spring acting to normally maintain an inwardly projecting stud or pin of the dog in engagement with one of the teeth of the lifting bar. The foot of the lifting bar is so pivoted that the foot may be swung or turned at any angle to the longitudinal axis of the bar, whereby the foot may be made to engage the end of the log from either side or from the front of the jack. The head of the bar flares outward



LANDER'S JACK FOR LOGGING, ETC.

from near the center, to afford a firm seat against the side of a log. The arrangement of the operating lever and links, with the connecting bolt, allows of the ready engagement and disengagement of the operating lever and ratcheted lifting bar.

© 1888 SCIENTIFIC AMERICAN, INC.

The Problem of Artificial Lighting.

In the course of a series of articles setting forth the modern view of electricity, Professor Oliver J. Lodge arrives at the conclusion that "light is an electrical disturbance, and that light waves are excited by electrical oscillations;" which conclusion he believes must ultimately have practical import. Professor Lodge remarks that our present systems of making light artificially are wasteful and ineffective. We want, he says, a certain range of oscillation—between 7,000 and 4,000 billion vibrations per second; no other is useful to us, because no other has any effect upon our retina. But we do not know how to produce vibrations at this rate. We can cause strings to vibrate one or two hundred or a thousand times per second, with the result of emitting a pure tone of definite pitch; but to get much faster rates of vibration, we have to fall back upon atoms. We can make atoms vibrate by what we call heating the substance; but the vibrations are then infinite in number and mode, and only a few of them are of use to us. As we do not yet know how to separate the vibrations that are useful to us from the great majority, we are obliged to excite them all together, at an obviously unnecessary expense. We take a lump of matter—say, a carbon filament or a piece of quicklime—and by raising its temperature, we impress upon its atoms higher and higher modes of vibration; not transmuting the lower into the higher, but superposing the higher upon the lower, until at length we get such rates of vibration as our retina is constructed for, and we are satisfied. The process is evidently wasteful and indirect and empiric. We want a small range of rapid vibrations; and we know no better than to make the whole series leading up to them. It is, says Dr. Lodge, "as though, in order to sound some little shrill octave of pipes in an organ, we were obliged to depress every key and every pedal, and to blow a young hurricane." If this remark applies to the incandescent electric lamp and to lime light, it also applies with even greater force to lights of combustion, in which a great amount of radiation is produced, but is not wanted; the only result really desired being the minute, almost infinitesimal, fraction of the whole effect which enables us to see. In short, the production of light waves, without any others, is held out by Professor Lodge as the problem of artificial lighting for the future.—*Journal of Gas Lighting.*

Diagnosis of Human Blood.

The diagnosis of human blood is discussed by Dr. Henry Formad in the *Journal of Comparative Medicine.* Especial attention is given to the methods of examining blood stains and measuring the blood corpuscles.

For testing the question whether a certain substance is blood or not, the spectroscope and chemical reagents come into play; but for the recognition of human blood the microscope alone is of any value, and the sole method yet found available with this instrument is that of measurement of the corpuscular elements. The differentiation of mammalian blood from that of lower orders of animals is made easy by the fact that in mammals alone is the cell round and non-nucleated. The differentiation between the blood of man and that of lower mammals depends entirely upon the micrometer.

Only the following animals have corpuscles larger than man, *i. e.*, larger than $\frac{1}{3200}$ of an inch, viz., the elephant, great ant eater, walrus, sloth, platypus, whale, capibara, and (according to Wormley) opossum. Animals the corpuscles of which are slightly below man in size, *i. e.*, having corpuscles from $\frac{1}{3500}$ to $\frac{1}{3200}$ of an inch average diameter, are the seal, beaver, musk rat, porcupine, monkey, kangaroo, wolf, and guinea pig. None of these are domestic animals. All other animals, including all domestic animals, have blood corpuscles of a mean diameter less than $\frac{1}{3500}$ of an inch; and, in fact, those animals which, as a rule, are blamed for blood stains found on the clothing and apparel of criminals (ox, pig, horse, sheep, and goat) have corpuscles with an average diameter less than $\frac{1}{4000}$ of an inch. He summarizes the facts as follows:

1. The blood corpuscles of birds, fishes, and reptiles, being oval and nucleated, can never be mistaken for human blood.

2. Fresh human blood cannot be mistaken, under the microscope, for the blood of any animal the corpuscles of which have a mean diameter of less than $\frac{1}{4000}$, or even $\frac{1}{3600}$ of an inch.

3. (*a*) If the average diameter of blood corpuscles in fresh blood is less than $\frac{1}{4000}$, then it cannot possibly be human blood; (*b*) if the diameter is more than $\frac{1}{3500}$, then it may be human blood; (*c*) if the blood corpuscles, after exhaustive measurement, give a mean diameter of more than $\frac{1}{3500}$, then it *is* human blood (provided it is not the blood of one of the wild beasts referred to).

The foregoing applies especially to the diagnosis of fresh blood. With regard to dried blood, it is claimed that this can be recognized just as readily, provided it has dried quickly. Blood that has dried slowly undergoes decomposition, and its morphology cannot be made out. A good liquid for remoistening blood is Muller's fluid; but perhaps the best is Virchow's solution, composed of thirty parts caustic potash and seventy parts water. At least five hundred measurements should be made in order to establish the average diameter of the cells.

If the corpuscles are spheroidal from absorption of moisture, or crenated from drying, they may still be diagnosed, because such changes are the same in the corpuscles of all animals, and have really their proportionate and corresponding ratio of alteration in form and diminution in size, the range or scale of diminution being always alike in the same animal.

The red blood corpuscles that have become spherical from imbibition of liquid have thus presented in Dr. Formad's experiments the following average diameters in the various animals: 1. Man, $\frac{1}{4800}$ inch. 2. Guinea pig, $\frac{1}{4600}$ inch. 3. Wolf, $\frac{1}{4600}$ inch. 4. Dog, $\frac{1}{4800}$ inch. 5. Rabbit, $\frac{1}{4900}$ inch. 6. Ox, $\frac{1}{5800}$ inch. 7. Sheep, $\frac{1}{6700}$ inch. 8. Goat, $\frac{1}{8100}$ inch.

These figures show that the diameter of the artificially spherical corpuscles in each animal is just about one-third less than that of the normal biconcave or disk-like corpuscles of the same animals.

The question has long been a mooted one as to whether the microscope can be depended on to determine positively or not that a given specimen of blood is that of a human being. Dr. Formad believes that this can be done, while other microscopists of equal eminence deny the possibility.

One-year Clocks.

W. H. Douglas, the author, pointed out that the great majority of clocks of the present day were dependent for accuracy of time on the isochronous beats, in a vertical plane, of a simple suspended oscillating pendulum, governing the motion of the wheelwork by an escapement which allows one tooth of the escape wheel to pass at each swing, the length of the pendulum regulating the rate of escape. Galileo discovered the isochronous property of an oscillating pendulum and its use to regulate clocks. Isochronous beats in a horizontal plane can also be obtained by a pendulum or weight suspended by a torsion spring and made to rotate backward and forward, allowing one tooth of the escape wheel to pass at each swing or turn of the pendulum, and thus to regulate the rate of escape. Coulomb, 100 years ago, found by experiment that the torsion pendulum within certain limits is also isochronous, and is affected by change of temperature exactly in the same proportion as the oscillating pendulum of Galileo. The torsion pendulum has a very much slower rate, and by its use escape of the energy of the main spring is reduced, so that it is possible by the use of the oscillating pendulum and a detached lever to apply the torsion pendulum to eight-day clocks, by this means converting them to clocks requiring to be wound only once a year. There is no change whatever in the wheelwork or main spring of an eight-day lever clock, except in the balance. The balance is removed, and in its place a lever is fixed to the staff carrying the roller pin which unlocks the lever escapement, and receives an impulse at each beat in the usual way, the additional lever imparting impulse to a tooth attached to the pendulum, thus inducing torsion at each beat of the clock. The regulation is effected by increasing the weight of the pendulum to make it lose, or decreasing the weight to make it gain. It is also regulated by means of a French sliding curb, moved by a screw to the right or left, which lengthens the spring as desired, either to make it go faster or slower without stopping the clock. The advantage gained by using the torsion pendulum with this escapement is that the present form of an eight-day lever timepiece may be at once transformed into a clock that will continue to go accurately without rewinding for twelve months. The escapement may be described as a frictionless pendulum; the impulse given direct across the line of center, as in the chronometer, is independent of oil and becomes detached at each beat; the isochronous property of the pendulum is not deranged by friction of any kind whatever. The cost of manufacture is precisely the same as in producing an eight-day timepiece.

The above is from a paper read before the British Association. It is to be hoped some of our ingenious clock makers will produce these year clocks. There would be a great demand for them.

How the English Maintain Foreign Commerce.

The Canadian Pacific Railway Company has signed a Pacific mail contract with the English government, says a Montreal dispatch. The service is to commence in 18 months, and the company will receive $225,000 annually from the Imperial government and $75,000 from the Dominion government, for ten years, for a monthly service to Yokohama, Hong Kong, and Shanghai. If an 18 knots average can be made on the Atlantic end, the Canadian route to Hong Kong can easily compete with the Suez line. The necessity for fast ships is thus indicated, and the dispatches hint that Australia, with only 4,000,000 population, pays $1,575,000 for purely ocean service, instead of the small amount appropriated by the Dominion as above given.

Vaccination.

That smallpox has greatly declined in England during the past fifty years is apparent from figures which have been published by Dr. Henry Thorne. From 1838 to 1842 the deaths from smallpox in England amounted to 57·2 per 100,000; in 1880–84 the death rate was 6·5 per 100,000. He thinks that vaccination has not only a direct influence in causing this reduction in the number of victims to smallpox, but that it has also a tendency to decrease the liability to the disease of children of vaccinated parents. In this connection it is interesting to note the *Medical Press* states that out of the five thousand children born every month in Paris only a thousand are vaccinated by the medical officers appointed for that purpose. The remaining four thousand infants are, therefore, either vaccinated by private practitioners or not at all. Seeing, however, that more than half the population apply for and receive gratuitous medical attendance, and that half the burials are gratuitous, it is very unlikely that all of the four thousand are vaccinated at the cost of the parents. It may fairly be assumed that a large proportion are not vaccinated at all, and that is why smallpox exists as an endemic disease at Paris, and does not disappear, as it has done, to a great extent, in Germany.

Elastic Traces.

Attention has been called from time to time to the advisability of lessening as much as possible the shock and strain which horses usually sustain in setting heavy loads in motion. There have been a number of methods suggested for obviating this, but there has been no general introduction of any of the systems proposed. The wear and tear on horses in our street car lines and heavy transport trucks is very great, and in all large stables of this class there are to be found a number of horses on the retired list, who are suffering from sore necks and strains occasioned by the sudden shocks and jerks of starting a heavy load. One of the simplest of contrivances we saw at the recent New Jersey State fair, used in plowing. It consisted of a spring at the point where the traces join the whiffletree. At the Eastern Railway station, at Paris, the horses used for shifting the cars from point to point have been provided with chain traces terminating in spiral springs. Since this system was introduced, about six years ago, there has been a marked improvement in the condition of the horses, and there has been much saving in the breaking of chains and harness. The horses have learned that a steady, even strain serves better than the quondam jerk at starting, and there has been found to be fewer sore necks, and the animals experience less fatigue, and are generally in sounder condition. The experiment has proved so far successful that this method has been extended through all the other departments of the extensive railway system under the control this company.

Low Bridges.

A brakeman, on so dark a night that he could not see around him, at the request of the engineer in charge of the train went to the top of a car to set the brakes, as was his duty, and without any fault of his own was knocked off the car, and seriously injured, by his head coming in contact with a bridge, built by the defendant company so low as not to allow a man on the top of a car to walk and stand erect. The brakeman had no knowledge or express notice of the dangerous nature of the bridge, or any opportunity of finding out its dangerous character.

Held, that he was entitled to damages against the defendants. There are cases which held that in such a case railway companies are not bound to erect the overhead bridges constructed by them of such a height that brakemen can stand or walk erect upon the tops of the cars without coming in collision with them. As applied to this case especially, we cannot approve of those rulings. Here the bridge was but 4 feet 9 inches above the top of the cars. The brakes were on the tops of the cars, and to get to them the brakemen were required to pass over the tops of the cars, not only in the day time, but also in the night time, and often doubtless, as in this case, when the night was dark, raining, and foggy, and when it would be almost, if not quite, impossible for them to know of the proximity of such bridges when called to brakes upon moving trains, even if they had knowledge that such bridges were maintained. To erect and maintain such bridges under such circumstances is negligence. Further reflection has strengthened the conviction on our part that this conclusion is fully sustained, both by reason and the better authority.

The danger from such a bridge is not a hazard ordinarily and naturally connected with the service. It is not shown that he was informed of the danger, nor that he had knowledge of it when he engaged in the service. As to his duty to exercise care for his own safety, both in discovering the danger and in avoiding the injury, the jury were fully instructed, and as we have said, and without being more specific, the rule was pushed beyond what reason and the law will sanction. (Ind. Sup. Ct., June 20, 1888. Louisville, N. A. & C. R. Co. vs. Wright. Opinion by Zollars, J.)

© 1888 SCIENTIFIC AMERICAN, INC.