

The Physical Basis of Knowledge.

The surface of the brain has many centers upon it whose functions have been carefully studied. In addition to these centers, there are tracts of nerve matter connecting them with each other, so that an associated or concerted acting of the brain centers becomes possible—indeed, is of constant occurrence. One hears the word "rose" spoken, and immediately the image of a rose is recalled; there is a recollection of its odor, of its color, of its size and shape, and a stimulus goes to the proper centers, so that the word "rose" may be spoken or written, if it is so willed. It is these tracts or paths of nerve matter that enable the brain to build up our complex ideas. It will be seen from what has been said that the word "rose" carries with it many elements, such as color and shape, learned by experience through the eyes; taste, by the tongue; odor, by the nose; weight, by the hands. But all these qualities of taste, color, odor, weight, etc., go to make up our complex idea of what a rose is. These varied primary or elemental ideas have reached the brain by separate channels, have formed memory pictures on the centers, which, in turn, have become associated by means of the intercentral nerve paths into complex ideas.

In addition to the impressions reaching the brain through the nerves of hearing, sight, taste, and olfaction, there is a constant stream of sensations pouring into the brain along the nerves of feeling. It has now been pretty well settled that some of the nerve fibers conduct sensations of heat, others of cold, some of pain and still others that sensation known as muscular effort, or the muscular sense. All these are carried to different parts of the brain and there registered. From this registry they can be called up as a memory of past experiences. It will now be clear that there is a constant stream of sensory currents or sensations coming into the brain from all parts of our bodies. These sensations have their mental accompaniment. When a current escapes from the brain, and goes outward for the purpose of moving some muscle or group of muscles, there is also a mental accompaniment. It is in this way that we are aware of how we are acting and being acted upon. These constitute states of consciousness. The conscious personality, or conscious ego, is the sum of all the states of consciousness at one time existing.

In a moment, by disease or injury, a man may lose the power to speak, and yet be able to read and write; or he may be unable to read, and yet hear what is said. Some may have the center of hearing so damaged that the power for music is gone and still be sound in every other respect. Some, again, may lose the power of recalling words. They know them when written or printed; but they cannot speak, because they cannot recall the words needed to express their thoughts. Enough has been said to show that the brain and all the nerve tracts leading to it and from it are the physical basis of knowledge. Derangement in these is followed by derangement in the mental powers. Insanity is only disease affecting the brain so as to derange and pervert the thoughts, language and actions of the person. This view of insanity has done much good, as it has led to a better method of dealing with insane people. The anatomical and physiological study of the brain shows that it is the organ of the mind; but further observations made in cases of disease and injury of the brain, as well as on cases of insanity, go to establish this doctrine beyond all dispute. Illusions, hallucinations, and delusions owe their origin to some derangement in the sense organs or in the perceptive centers in the brain. Following upon this, the conscious ego is no longer in its true relationship to its environments, and there is, as a consequence, derangement of conduct, as the result of the physical disease.—John Ferguson, M.D., Canadian Magazine.

Dangers of Bicycle Tires.

A dispatch to the New York Herald from Jeffersonville, Ind., August 23, states that while Lyman Parks, twenty years old, son of Prison Director Parks, of that city, was on a trip to Corydon, the tire of his bicycle burst, and with the assistance of another cyclist he inserted a new inner tube and proceeded to pump it full of air.

Parks was bending close over the wheel of his machine, while his companion stood close by looking on. Suddenly there was a report like the discharge of a shotgun. Parks and the other cyclist were knocked off their feet. The tire had burst with violence.

Parks' companion was the first to rise, and found Parks badly injured about the face and completely

blinded by the explosion. He took the young man to Corydon, where a physician attended him.

Parks was brought home next morning. He will recover his eyesight, but the injury caused by the concussion might have killed him had he been directly in the line of the flying fragments.

A RECORDING THERMOMETER FOR CLOSED SPACES.

In designing this thermometer the object has been to produce an instrument which would make a continuous record, day and night, of the temperature in heaters, ovens, dry kilns, and such closed spaces, and at the same time permit the recording portion of the apparatus to be located at any convenient point out-

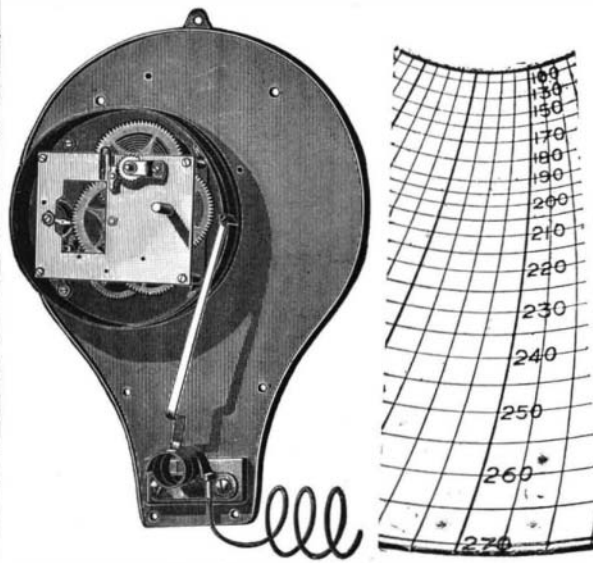


Fig. 2.

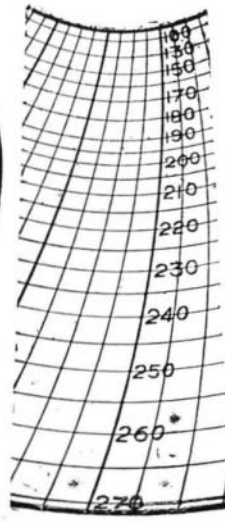


Fig. 3.

side of the room or kiln where the temperature is to be measured.

The instrument is shown in Fig. 1, set up and ready for operation. The wall of the oven is broken away, showing the coil of pipe, suspended at the point where it is desired to measure the temperature. The recording part of the instrument is shown at the left side of Fig. 1, and is connected to coil D in kiln, or oven, by a small flexible copper tube. Fig. 2 shows the interior of the recording portion of the apparatus, which consists simply of one of Bristol's recording pressure gauges. The coil, D, in the oven is partly filled with alcohol and the remaining air is exhausted. When heat is applied to the coil the vapor of the alcohol condenses and completely fills the pressure gauge tube and the small copper tube leading to it. The pressure

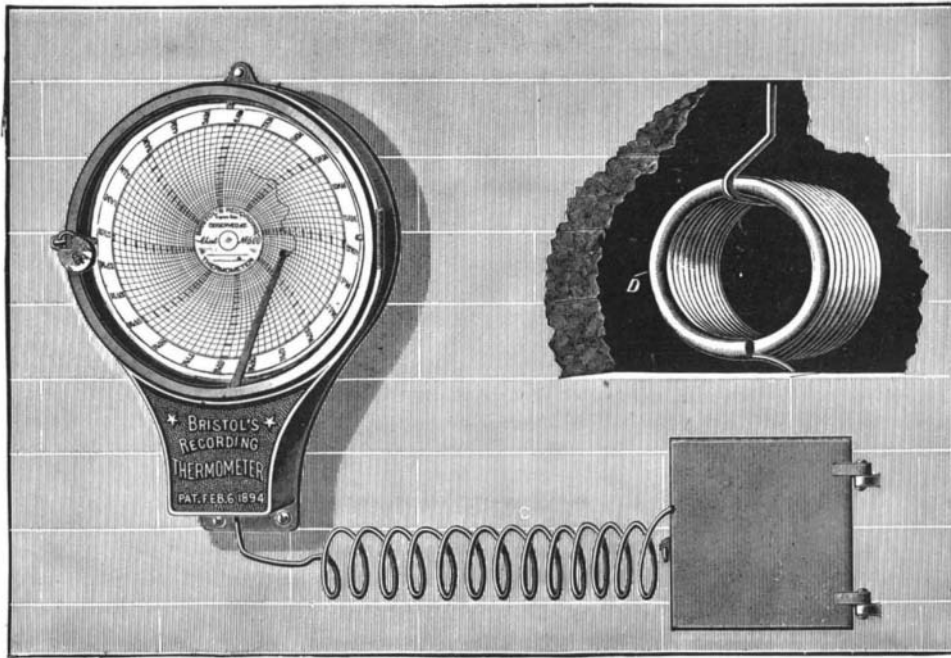


Fig. 1.—A RECORDING THERMOMETER FOR CLOSED SPACES.

due to the temperature of the oven or kiln is transmitted to the recording gauge.

The scale on the gauge chart is graduated in degrees Fahrenheit by means of a standard thermometer. The coil, D, is immersed in oil for standardizing in connection with the graduating chart.

There is no compensation required for changes of temperature in the room where the recorder is placed, as the small copper tube is completely filled with alcohol and the pressures due given temperatures are always the same.

Fig. 3 shows a specimen section from chart of one of these thermometers for a range of 270 degrees Fah. It will be observed that between 170 and 270 degrees the scale is very open. A number of these instruments have been in successful operation in rubber works for the past four months, for keeping a record of the temperature in heaters during the process of vulcanizing rubber goods.

These thermometers are being manufactured and placed on the market by the Bristol Company, of Waterbury, Conn.

A working model of this apparatus was exhibited and described at the Brooklyn meeting of the American Association for the Advancement of Science by W. H. Bristol.

Woodwork vs. Flame.

In a London paper is published a letter from Mr. F. H. Gossage, who makes some interesting statements. He says:

"I find that painting woodwork of any kind with several coats of solution of silicate of soda, and finishing with a mixture of this solution and sufficient common whitening to make it about as thick as ordinary paint, is an excellent protection against fire. Wood treated in this way will not take fire from mere contact with flame; it requires to be heated till destructive distillation begins. Then, of course, gases are given out which ignite, and the wood is gradually converted into charcoal, but until destructive distillation takes place the coated wood will not support combustion. A few years since I had some screens made like ordinary doors, some prepared as I have described and some not. They were then placed over a fire of shavings, which was kept constantly renewed. In ten minutes the unprepared screens were blazing away, and so nearly consumed that they had to be supported by an iron bar. The flames continued to lick the prepared screens for thirty minutes before the distillation commenced. After forty-five minutes the coated screens were still intact and able to support themselves; they held together for an hour, although pierced in many places with holes, and when the fire was removed they did not continue to burn. This was a splendid success, and I still have the remains of the screen. The experiments were made at my suggestion for the managers of the Liverpool Philharmonic Society, and the woodwork of their splendid hall at Liverpool was treated in this manner."

Ornamentation of Glass with Aluminum.

M. Charles Margot, of the physical laboratory of the University of Geneva, says L'Industrie, has just made a curious discovery. He has found that by rubbing on glass with an aluminum point we obtain clear metallic lines, which cannot be removed by washing, no matter how often repeated. This property which aluminum possesses, of adhering closely to glass, or in general to any substance having silica as its base, is most plainly shown when the surface is dampened or covered with a very light coat of moisture, as, for instance, when a man breathes upon the surface of the glass. An indispensable condition is that the glass and the aluminum point shall be clean.

M. Margot has arranged a special apparatus for his experiments. He uses a lathe of aluminum, which turns very quickly, and with it he traces designs on the glass. These lines have a bright metallic reflection; polishing with a steel tool gives them the appearance of metallic incrustation. The adherence to the glass is absolute. Without doubt we can, by treating the decorated glass with caustic potash or chlorohydric acid, remove the metal, but the design remains. The lines are clearly fixed on the glass, as if the surface had been corroded by the metal.

It is known that magnesium, cadmium, and zinc have similar properties, and that they will leave visible traces on glass. None of these metals, however, possesses this property to the same extent as aluminum, except possibly magnesium. On the other hand, besides the fact that magnesium oxidizes

very quickly, the traces which it leaves on glass vanish quickly, and therefore the metal can be used for this purpose only under special circumstances.

Many applications can be suggested for aluminum in this direction. It can be used instead of the engraver's tool in cutting designs on glass. With the aluminum pencil diamonds can be distinguished from imitation, since it will make no mark on a diamond. It is possible that the new discovery may make a great difference in the making of cut or engraved glass.

It is generally supposed that when a man's heart pulsations go down to 40 a minute death will follow unless restoratives are administered. Parisian doctors are now, it is said, puzzled over a man, in one of the hospitals, whose pulsations have sunk as low as 18 a minute, although to all appearances he is well and strong.

The Plague in China.

J. A. Davis, D.D., formerly missionary of the Reformed (Dutch) Church in China, writes as follows in the Independent:

The disease causing such fatality and consternation in China is neither new nor unknown. Several centuries ago it is said to have swept over and almost depopulated that empire. Occasionally since it has visited that country, but with far less dreadful results. Its symptoms are almost identical with those of the Black Death that robbed Europe, during the seventeenth century, of twenty-five millions of people and destroyed one-sixth of the population of the city of London.

Though the present visitation in China seems sudden, the plague has really been at work in the extreme southwestern part of the empire for more than fifteen years. Occasionally it appeared somewhat epidemic, but not until a few months ago did it assume its present malignant character. It seems to have been slowly gathering strength for future conquest. At the beginning of the year it first made its appearance in Canton.

Even the British colony of Hong Kong, with its well governed and guarded city of Victoria, seemed indifferent for a time to the danger threatening. Possibly it was thought that a paltry hundred miles of separation, though there was constant communication between the two cities, would be a protection. Perhaps they trusted to their insular position, or supposed that the plague sought its victims among the dirty and filthy alone. If this last was their hope, they forgot the Chinese quarter of the city. Early in May there was a rumor that a Chinaman had been stricken with the plague in the Island City. That rumor was speedily duplicated; then both were verified. The awful plague had entered the native quarter and found a breeding place. The authorities were alert and acted swiftly and with decision. A careful inspection was made of houses in the infected districts; every patient was hurried off to a hospital or the pest ship Hygeia; a strict quarantine maintained, and the bodies of the victims buried in quicklime. These decisive measures aroused the Chinese. They were indignant that their houses were searched, angry at the quarantine, enraged that the helpless sufferers were torn from their homes, and furious that the bodies of the victims were buried beyond all hope of removal later. The quicklime, of course, speedily dissolved bones and flesh, leaving nothing for removal to the ancestral burying ground. This excitement increased until riots were aroused. Inspectors were assaulted and beaten, and

the property of a Chinaman who is a member of the Board of Health was attacked and destroyed. Fortunately the government was watchful and fearless. Riots were speedily put down, and ringleaders severely punished.

How many have already fallen victims in Canton and Hong Kong cannot be told. They must be counted by thousands; and the number of daily victims is rapidly increasing, though multitudes of natives as well as foreigners have fled from the stricken cities. The plague, no longer confined to Canton and Hong Kong, is spreading eastward, northward, westward; and no human being can say where or when it will reach its bounds. Foreigners are using their limited powers to stop its progress, but in vain. With slow but invincible step it marches on.

The symptoms of the disease, in its malignant form, are a chill, followed by a sudden and very high fever. The temperature rises above 105° Fah., and remains high to the end. Headache accompanies the fever, and is followed speedily by stupor that grows more and more deep until death ensues. Usually within twenty, often within twelve hours after the chill a glandular swelling appears, and increases rapidly until it becomes as large as a hen's egg. It is hard, yet very tender, but thus far has not, as in the plague of the seventeenth century, shown a tendency to suppurate or even break. The swelling is occasionally on the neck, oftener under the arm, usually in the groin. In many cases there appear under the skin, in the latter stage of the disease, black spots; these remain after death. They gave the name of Black Death to the disease of former centuries. There is besides this very little eruption of the skin. The appearance of the black spots is regarded a sure token of the nearness of death. That usually comes within forty-eight hours after the chill, though some patients linger three and four days. If they survive beyond the fifth day, there is great probability of recovery.

Of course it is believed that the plague is contagious, though many facts can be given to prove that it is not; perhaps more to prove that it is. Certainly foreigners, especially physicians, move about in the plague districts without taking the disease. Nor has it shown much tendency to invade cleanly portions of the towns where it has found a home. Foreign physicians are carefully studying it, and learning that the plague today is identical with that of two centuries ago. Its hiding place is in the dirt; its breeding place in filth. Purity is its foe, and cleanliness starves it to death.

Physicians have discovered, so they testify, that the bacillus of the plague differs from all others thus far found in the human blood, and resembles closely what has been discovered in the blood of animals. Animals inoculated with plague virus developed the disease, showing its various symptoms, and died. Medical men are experimenting with bactericides, hoping to discover one that will destroy the deadly plague bacilli before they have become masters of the human body. Such a discovery, while it might save millions, would remove from hundreds of millions more of terrified humanity the awful dread that is now almost paralyzing them.

The time between contact with and the development of this disease is from twenty-four hours to eight days. Though the usual period of incubation is two or three days, when the plague assumes its malignant character, it develops within twenty-four hours.

Cement Water Tanks.

In the Chemical News Dr. T. L. Phipson gives an account of an extraordinary sample of water he had received for analysis. A gentleman in the country sent him about four quarts of what he termed "drinking water from a new reservoir." The sample was colorless, bright, and clear, had no deposit and no odor; but it had a distinctly bitter taste and an alkaline reaction. It turned red litmus paper blue in an instant. This water, he was informed, was good for nothing. It was impossible to drink it; it cooked vegetables badly—depriving them of their color; and when used for washing, it attacked the hands. It became milky when a current of carbonic acid was passed into it; and it contained a considerable amount of caustic lime—yielding to analysis exactly 100 grains of lime to the imperial gallon; but in other respects it was not rich in saline or organic matter. Having followed up the subject, Dr. Phipson learned that no water was supplied to the house, and there was no well. The rain water which fell upon the roof was collected, and conducted by an iron pipe into a subterranean reservoir supplied with a pump. This reservoir had been lined with hydraulic cement, which was probably of bad quality, and yielded up caustic lime, sulphate of lime, and other salts in smaller amounts, and of less importance to the water. Dr. Phipson thinks the results point to the importance of such cements being submitted to very careful chemical examination before being used for reservoirs destined for the storage of water for domestic purposes.

RECENTLY PATENTED INVENTIONS.**Engineering.**

FEED WATER HEATER.—William L. Harvey, Stanberry, Mo. According to this invention a tube in the fire box has one end connected with the lower part of the boiler and its other end with the water supply, a branch pipe being in communication with the upper part of the boiler to permit a circulation of the water in the tube when the water supply is cut off. The construction is extremely simple and durable, and designed to quickly heat the incoming feed water while promoting a rapid circulation of the water when the feed is cut off.

PROPELLER.—Daniel H. Welch and James L. Lovell, Astoria, Oregon. This invention is an improvement in propellers whose blades are made separate from each other and secured to a hub by dovetail ribs and sockets. The shaft has a tapered portion on which the hub fits with dovetail seats, the propeller blades having base portions with tapered seats fitted to those of the hub, while a washer fitted on the shaft bears against the rear ends of the base portions of the blades, there being devices whereby the washer is pressed against the blades and the hub tightened on the tapering portion of the shaft.

Electrical.

MOTOR REGULATOR.—Joseph F. Sheahan, New York City. An improved mechanism for regulating the speed of motors used in operating organ bellows has been devised by this inventor. A single rheostat is arranged in the motor circuit, with an automatically operated weighted rheostat arm, there being a pull-knob operatively connected with the arm to raise it against the weight and render it operative by hand as well as automatically. The invention does away with a second rheostat and provides a very simple means by which the motor regulating the rheostat may be operated from the organ loft or any convenient place.

Mining.

ORE CONCENTRATOR.—George H. Hooper, Hague, N. Y. According to this invention the sieve has a jiggling action and is simultaneously laterally reciprocated, the action taking place in water and the cleansed minerals being directed to one end of the sieve, the refuse material being fed to an overflow at the opposite end. There is a solid overflow at one end, an outlet for washed minerals at the opposite end, and a screening section interposed between the two, there being an elevator beneath the screening section for conveying away material for further treatment. A further patent, granted to the same inventor, provides for the employment of a plunger in connection with the screen, the upstroke of the plunger creating suction at the screening surface, to which the mineral clings and is gradually worked to the forward end. The mineral may be drawn off or removed by hand while the machine is in operation.

Mechanical.

GRINDING WHEEL.—Fred W. Beckert, Ottumwa, Iowa. This inventor has devised an emery or corundum wheel in which the water is fed through channels from the center to the circumference of the wheel, whereby it is more evenly distributed over the surface, and glazing and irregular wear prevented.

FLEXIBLE PIPE JOINT.—Albert J. Sargent, Wilkensburg, Pa. To produce a limited flexing movement in a joint, and still afford a continuous passage of ample dimensions through a line of pipe having many such joints, is the object of this invention. Combined with two tubular joint sections having incurved segmental ends is a round bodied and transversely perforated plug with reduced threaded extensions, on which plug the joint sections are fitted, there being two clamping cap pieces and compression nuts on the threaded extensions of the plug.

Miscellaneous.

REVOLVING COAL SCREEN.—George W. Cross, Pittston, Pa. An open-ended frame having an outer screening surface, according to this invention, carries conical inner screens, a chute projecting into the contracted end of the innermost screen. The coal screened is divided into sizes, the stove or nut coal being delivered near the elevated receiving end, while the pea coal and screenings are delivered at the lower end, the invention also providing convenient means for feeding coal and water into the screen.

BALING PRESS.—Andrew C. Miller, Commerce, Mo. This press automatically forces material into the press box and forces out the formed bales, the operation being easy and rapid and the construction inexpensive. The feed box is arranged at right angles to the press box, in which are longitudinally reciprocating plungers actuated alternately by rods and a cam mechanism.

LOG ROLLING HOOK.—George S. Kaime and Ole Stenerson, Neceah, Wis. This hook permits of conveniently rolling a log over the ground or on skids without undue exertion. The hook is connected to a draft beam and curves downwardly and forwardly, there being rearwardly projecting handles, and anti-friction bearing surfaces within the concave side of the hook to move with the log as it turns.

BOOT OR SHOE.—Ernest A. Thurston, Placerville, Idaho. According to this invention the edge of the upper is turned outward and a metal re-enforce applied on it, there being between it and the sole a binder, screws passing through the re-enforce and edge of the upper into the sole. The attachment of the sole to the upper is strong, the boot or shoe being designed to be waterproof and the upper leather protected from abrasion.

BUCKLE.—David F. Stayman, Muncy, Pa. This buckle comprises essentially but two parts, so arranged relatively to each other that the buckle will be a self-locking one. It comprises two frames, one having a sliding connection with the other, and both hav-

ing openings for the passage of the material to be clamped, a lock carried by one frame being adapted for engagement with the opposing frame.

BUCKLE.—George M. Aylsworth, Collingwood, Canada. This is an improvement on a formerly patented invention of the same inventor, adapting the buckle for an attachment upon harness or other straps and avoiding the necessity of sewing or riveting the buckle frame in place on a part of the strap that is supplied with the improvement. The construction is such that the buckle may be cheaply produced.

NEEDLE CASE.—James J. Morrison, New York City. This is a cheap and simple article adapted to hold a quantity of needles, and when not in use it may be conveniently thrust into the bore of the common thread spool, where it will be retained in place by friction. The case is preferably longer than the spool, its protruding end facilitating the removal of the case from the spool.

BLACKBOARD.—William T. Slaughter, Greenville, S. C. In this article, in addition to the ordinary stationary face, a chart may be employed, to be wound upon either of two rollers, out of sight at the back of the board, the arrangement being such also that both sides of the chart may be utilized, and any desired subject upon it be brought to view at the front of the board and there held.

DOOR HANGER.—Theodore C. Prouty, St. Joseph, Mich. This improvement relates to hangers and tracks for sliding doors, providing a ball bearing wheel for use with the hanger, the latter being arranged in such a way that the bearing balls will always be in proper place and will not need adjustment. The track is light and substantial, preferably pressed from sheet steel, and put up in sections, so that it may be easily put up and taken down.

TOBACCO CUTTER.—George K. Walker, Maquon, Ill. This is a cutting machine of simple and durable construction in which it is easy to thoroughly remove gummy or other matter adhering to the cutting blade, so that the machine will always be in good condition for its work. Adjustable scrapers are arranged to be readily brought with more or less force into contact with the opposite faces of the knife blade.

DISH CLEANER.—Jacob N. Tinkler, Kalkaska, Mich. An inner cylindrical vessel fits loosely in an outer one, their walls separated by flanges, the dishes to be cleansed being placed in the inner vessel, hot or soapy water poured over them, and the vessel revolved to cause a rapid circulation of water through passages provided therefor between the two vessels, the drainage being effected by elevating the inner vessel.

MUSTACHE CURLER.—William S. Cooper, Newport, R. I. This device is composed of three hinged members arranged to be partly or wholly opened out or closed. The device is of simple and compact construction, easily manipulated and very durable. It is also adapted for the curling of ladies' hair as well as for mustache curling or twisting.

FRUIT HOLDER.—William McAusland, Taunton, Mass. This is a device designed to hold

a single orange or other piece of fruit, to facilitate the eating thereof with a spoon. The invention relates more directly to that form of holder in which a cup is mounted on a suitable base and provided with spurs or prongs which engage with and hold the half of an orange while one is using the spoon.

TRUCK.—Frederick Peter, Anna, Ill. This inventor has devised an improvement in hand trucks with a single wheel, the construction being extremely simple and inexpensive, and the truck being adapted for use as a barrow, a sled, a table, or a stepladder, the changes from one form of use to another being readily and conveniently made.

CLAMP.—Andrew J. Courtney, Pine Ridge, Cal. This is a device for bundling and maintaining in bundled form timber of any description, whereby it may be handled more quickly and economically than when each piece of timber is separate. The clamp proper comprises two sections, in connection with which a lever is employed. It is very simple, inexpensive and easily manipulated by unskilled labor.

RAKE.—Charles C. Quigley, Havana, N. Y. This is an improvement in garden and lawn rakes, combining in one implement a rake which may also be employed for removing leaves or other foreign matter from a lawn. The handle may be shifted to use the rake upon either side, and the construction is very simple and inexpensive.

MOLE TRAP.—William A. Reddick, Niles, Mich. This trap has a vertical frame carrying a plunger rod forced downward by a strong spring, and having at its lower end a crosshead armed with downwardly pointed tines or spears. The plunger rod with crosshead is engaged by a catch when raised or set, and is thrown by trigger lifted by the mole, who is thereby caught and impaled upon the tines.

Designs.

SCARF PIN.—John H. Theberath, Newark, N. J. This pin has for its head a grotesque figure of a youth having on a silk hat and holding to his lips the head of a cane.

WASHER.—Thomas J. Park, Rensselaer, Mo. This washer is made in a beveled rectangular figure forming a border for a central circular opening.

TIP FOR CLOTHES TONGS.—Thomas J. Coons, Osage City, Kansas. This tip has an ornamental configuration of a general V-shape, one member extending beyond the other member and terminating in a rounded edge.

HANDLE FOR SPOONS.—George P. Tilton, Newburyport, Mass. The obverse and reverse of this design each present a number of reed-like members, while the top of the handle at the front has a central plain oval figure with a beaded border.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.