

SCIENCE AT THE BRITISH ASSOCIATION.

We continue below our brief abstracts of the more important papers read at the recent session of the British Association at Plymouth, England.

EXPERIMENTS ON THE ELASTICITY OF WIRE

have been begun in the University of Glasgow. Thus far the investigation has extended to the effect of continued application of force on the breaking weight of steel wire and soft iron wire. It is found that, when a weight nearly as great as the breaking weight is kept for a long time—several days for instance—and applied to pull out a soft iron wire, the effect is to increase the strength of the wire as much as 6 or 7 per cent. The

CONDITIONS UNDER WHICH LIQUID CARBONIC ACID EXISTS IN MINERALS

was the subject of a paper by Mr. W. N. Hartley. A method was described of determining the exact temperature at which the carbonic acid sometimes found inclosed in minerals becomes gaseous. This has been determined to be 30° 92 C. The investigation has led to some interesting results concerning the motions of the bubbles in fluid cavities when influenced by heat. Bubbles in certain cavities approach the heated source, in other cavities they recede. A rise of temperature of 5° C. causes apparent attraction, while a rise of ½° C. in some cases causes repulsion. In certain cases a bubble which receded from the source of heat at ordinary temperatures approached it when raised to 60° C., the source of heat always being from ½° C. to 5° warmer than the specimen. Mr. Hartley has also examined a remarkable vibration of minute bubbles in fluid cavities. It was found that these bubbles approached a warm body brought near them, and that they ceased moving and clung for some time to the warmer side of the cavity. The conclusion arrived at for these phenomena is that an easily movable particle, which can be set in motion by exceedingly slight differences in temperature, will make the transference of heat from one point to another plainly visible. The minute bubbles in the cavities are such particles, and these vibrator motions afford ocular demonstration of the continual passage of heat through solid substances.

Mr. Silvanus P. Thomson, discussing

BINOCULAR AND MONOCULAR VISION,

stated that light is more powerful in producing an effect when concentrated upon one eye than when equally distributed to the two, though according to what law experiments are not yet sufficiently numerous or exact to determine; but, on the other hand, the light so concentrated on one eye does not produce the sensation of twice as much illumination as the half of the light viewed by both eyes at once.

TEMPERATURE COEFFICIENTS OF INSULATING ENVELOPES.

Mr. Bruce Warren had already shown that the rate of variation in the insulation resistance of a core or cable under changes of temperature could be determined for any period of contact. He now points out that an important consequence of the phenomenon of electrification being reducible to an intelligible variation is that we can calculate not only the changes in the resistance due to variation of temperature, but we can ascertain with the same precision any required change due to prolonged contact at any required temperature. It also appears that electrification, which is an inseparable property of all insulators, follows some law of variation in which the temperature coefficient of the insulator itself is a function.

ACTION OF FATTY OILS ON COPPER.

Mr. W. H. Watson stated that paraffin and castor oils have the least action upon copper, whilst the action of sperm and seal oil is slight. Linseed, olive, almond, colza, sesame, and neatsfoot oils all act considerably upon copper, the action of linseed oil being especially great. The author concludes that the comparative action of different oils cannot in all cases be decided upon from the appearance of the oils after exposure to copper plates, though minute quantities of the metal may be easily detected in most oils from the color produced.

CHANGES IN CANDLES PRODUCED BY SEA WATER.

Professor Gladstone had examined some candles taken from the wreck of a Spanish vessel which had been submerged for 173 years. The fat had been converted mainly into calcium and sodium salts. Although, however, the fats have been in contact with a practically unlimited quantity of sea water for the above lengthy period, and a chemical change between them has been possible, the double decomposition has proceeded so slowly that the reaction is only about half completed at the present time.

CONSTITUTION OF ARCTIC COAL.

Mr. T. Wills has examined some coal from the side of a mountain gorge about two miles from Discovery Bay. By comparing the results of an analysis with those of obtained from another analysis of a mixture of specimens from thirteen different seams in English coal fields, Mr. Wills has found that arctic coal possesses very nearly the same composition.

PROTECTION OF IRON SURFACES BY FORMATION OF BLACK OXIDE.

Professor Barff stated that a perfectly adherent and coherent coating of black oxide which will protect iron from corrosion may be formed as follows: A wrought iron muffle, containing the iron articles to be operated upon, is heated to a dull red heat, all the openings closed, and dry steam turned in. The muffle is kept filled with steam for from three to five hours. The fire is then raked out, and the articles are

allowed to become black in an atmosphere of steam. After this the steam is turned off, and the muffle and its contents are allowed to cool slowly. The temperature to which the muffle is heated varies according to the nature of the articles operated upon, from 662° to 1,292° Fah.

IMPROVEMENT IN MANUFACTURE OF BETON.

BY JOHN C. GOODRICH, JR., OF NEW YORK.

In the method now employed of making beton or concrete, cement and sand are used without previously preparing the cement. In the Coignet methods sufficient water only is added to make a plastic pulverulent paste. This does not contain sufficient water to form hydrates, unless lime enters largely into the composition, in which case the moisture held by the lime is taken up by the cement during its crystallization, the lime absorbing its moisture from the air; but lime in a large quantity weakens the beton, from having but a low adhesive power in comparison with cement. Neither is it able to withstand the action of water or fit for underground work, as it does not become hard when kept constantly damp, nor does it become hard in the interior of large monoliths when it is removed from the effects caused by the atmosphere.

In the other and ordinary methods a larger quantity of water is used, sufficient to make a semi-liquid mass that will flow. This excess of water is forced out of the concrete by the contraction of the cement during its crystallization, and leaves the stone porous. It also prevents the proper ramming of the beton, and gives rise to the difficulty known as "laitance," hereinafter described. On the other hand, a beton containing too little water becomes friable.

My process is as follows: When, in the construction of large monoliths or structures, largely underground, the checks and efflorescence which usually appear are not a serious objection. Sand and cement may be mixed in the proportion of from three to six parts of sand to one of cement. This may be done by means of machinery or by hoes, shovels, and rakes. During this process water is added by means of a hose or watering pot having a rose jet. The water is added gradually until the sand and cement contains so much that a handful of beton will, if tightly squeezed, allow a little water to exude, but will, when laid down, still retain the impression of the hand. The beton so mixed will have about the consistence of melting snow. It can be compacted in the same way, and pressure will force the moisture out of it. This condition, though difficult to describe, is learned at sight by the workmen, and the correct amount of water is more accurately gauged by trying the beton from time to time in the hand during its mixture (as it varies in different cements) than can be done by any rule of measurement. The beton is then placed in position and rammed, as described below.

The quantity of water thus gauged will be enough to form hydrates, in combination with the components of the cement, leaving no excess to be forced out during crystallization, and does not prevent the proper ramming of the beton, while there is not sufficient to cause laitance. But to obtain a perfect result where a finished surface is requisite, and to make a beton free from the deleterious ingredients that are found in all cements, and to insure the use of a proper quantity of water, I proceed as follows: Having obtained the heaviest slow-setting cement, the first step in this process is to separate from it the light, earthy impurities—the uncombined lime and clay and the soluble salts. This can be done to a considerable extent by a regulated current of air being driven against the cement while falling from a height, and in a proper inclosure; or it can be done by revolving screens, or by means of a centrifugal mill; and I claim these methods to be equivalents of the following. But the method which I prefer, and recommend as much more perfect, is to allow the cement to fall slowly into a box filled and constantly fed by a stream of water, the entrance of which is preferably near the bottom of the box. One side of the box is lower than the others, for the overflow of the water. Where a constant stream of water cannot be had the result may be obtained by agitating the cement with water in a swinging box or other convenient way, pouring off the water and supplying its place with fresh water from time to time.

A box may be placed in and on the bottom of the larger box to collect the cement as it settles. The portion thus preserved consists of the heavy, gritty, and inactive parts of the cement, which is without adhesive power, and which acts simply as so much sand. This equals about ten per cent of the whole mass of cement.

Cements containing a larger amount than usual of this gritty portion may, when mixed pure, stand a high test, but will not bear a large admixture of sand. With this gritty part settles the true cement, which we call the "matrix." This is that portion which is capable of crystallization or hydro-silicization called "setting." This portion of the cement is the only one of value, and is about 80 per cent of it.

The third or lighter portion, which is washed away with the overflowing water, consists of impurities, light earthy matter, uncombined lime and clay, and soluble salts. This portion of the cement is entirely without adhesive power, and, when separated from the other portions of the cement, acts in all respects like the impure and dirty clays. When dry it shrivels and contracts, and when wet expands and becomes slippery. This portion of the cement is the cause of the unsightly checks, and what appear to be cracks, but which are simply projections of this earthy portion, which,

by its own action in contracting and expanding, and the crystallization of the cement, has become separated from it. With this earthy portion the alkaline salts, consisting mainly of soda and potash, escape. This is the portion that causes the efflorescence or white appearance on the stone as heretofore made, and also what is known as laitance on concrete laid in water.

The light, earthy, and soluble portions having been removed from the cement, the supply of water is turned off, and it is all allowed to escape from the wash-box.

The cement, freed from its deleterious portions, and being thus saturated or supplied with the proper amount of water, is thoroughly mixed by machinery, or by means of shovels, hoes, or rakes, with clean, dry, sharp sand, in the proportions of from three to six parts of sand to one of cement, according to the strength desired.

The beton thus mixed is rammed into position, layer by layer, with a pounder, having knobs or projections to make an irregular face. The irregularities made by the pounder on the top of the layer leaves it much the better bonding of the succeeding layers.

During the process of ramming and compacting, large stones of suitable shape to form a good bond may be put into the mold or mass, and the beton rammed around and between them, the stones not being allowed to come in direct contact with each other. This gives stronger work, and allows more thorough ramming and the use of larger stones than where in the usual way broken stone is mixed with the sand and cement before being put into the mold or mass.

The phenomenon of laitance is one of the gravest difficulties besetting the laying of concrete under water. It is caused by the impurities hereinbefore set forth. When the concrete is mixed in the ordinary manner, so as to form a semi-liquid mass, these impurities rise to the top of the layer in position, gradually subside and deposit an unctuous stratum. Thus between each layer of the concrete is interposed a slippery layer, utterly preventing any union or bond between the layers of concrete, and very seriously impairing the solidity and strength of the structure. The former of my processes prevents this, since the beton is sufficiently dry to prohibit any movement of its component parts. The second modification of the process prevents it for the same reason, and because the impurities forming the laitance are themselves eliminated.

Inventions Patented in England by Americans.

From August 21 to August 27, inclusive.

- ELEVATORS.—C. Baldwin, Brooklyn, N. Y.
- MOTIVE POWER ENGINE.—F. M. Townsend (of Memphis, Tenn.), Liverpool, England.
- PLUMBERS' TRAPS.—J. E. Folk, Brooklyn, N. Y.
- RAILWAY SWITCHES.—J. S. Williams (of Riverton, N. J.), London, Eng.
- SPRING BEDS.—W. Peacock, New York city.
- STEAM ENGINES.—G. B. Massey, New York city.
- STOPPERS.—N. Thompson (of Brooklyn, N. Y.), London, Eng.
- SURVEYING INSTRUMENTS.—H. Wadsworth, Duxbury, Mass.
- UMBRELLAS.—W. H. Richardson, Philadelphia, Pa.
- WIRE-DRAWING MACHINERY.—J. S. Winsor, Providence, R. I.

NEW BOOKS AND PUBLICATIONS.

ON THE SCIENCE OF WEIGHING AND MEASURING. By H. W. Chisholm, Warden of the Standards. Illustrated. Macmillan & Co., London and New York. Price \$1.50.

This is a capital treatise written by one who is *ex-officio* an authority on its subject. The scope of the book includes the following general heads: Definition of weight and measure; ancient standards of weight and measure; English standard units of weights and measures; the restored standards, imperial standard pound and yard; secondary imperial standard; derived units of imperial weight and measure; the metric system, and weighing and measuring instruments and their scientific use. There is an abundance of valuable information gleaned evidently at the cost of industrious research, the engravings are many and good, and the work in all respects is fully up to the latest progress.

Recent American and Foreign Patents.

Notice to Patentees.

Inventors who are desirous of disposing of their patents would find it greatly to their advantage to have them illustrated in the SCIENTIFIC AMERICAN. We are prepared to get up first-class WOOD ENGRAVINGS of inventions of merit, and publish them in the SCIENTIFIC AMERICAN on very reasonable terms.

We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED COMBINED DIVIDER AND SIDING HOOK.

Homer Sherman, Flushing, Mich.—The object of this invention is to furnish for carpenters an improved tool that combines the advantage of a pair of dividers and of a siding hook with a marking knife scale, bevel square, etc., forming a simple and handy implement for cutting and marking boards in siding and wainscoting. This invention consists of a siding hook having a straight back and a fixed point, in combination with a pivoted divider leg. The tool may be used as common dividers, or for setting off bevels and squares, by a swinging leg, when the straight back of the siding hook is placed against the edge of the board, or it may also be employed in siding, as dividers, hook, and marking knife may be used at will, and for wainscoting, and for other applications in carpentry.

IMPROVED PLANTER AND MANURE DISTRIBUTOR.

John Real, Double Springs, Miss.—This invention relates chiefly to the use of a harrow which is so arranged as to cover the cotton seed, and is also made vertically adjustable at its front end. Cultivating plows may likewise be easily attached place of the harrow.

IMPROVED PERFORATOR FOR PRINTING PRESSES.

James A. Carruth, Topeka, Kansas.—This invention consists in providing the frisket finger of a printing press with perforating teeth. The perforator is triangular in cross section, and is provided with a cutting edge that is serrated and with a square end piece, through which a hole is bored for receiving a bolt that secures it to the nipper frame. The perforator

moves with the nippers, and when the platen presses the paper against the face of the type it also forces it against the serrated edge of the perforator which is backed up by the furniture of the chase. The paper is thus punctured along the line upon which it is to be separated, and the holes are more or less numerous, according as the serrations in the perforator are coarse or fine. The invention consists of a knife-like piece of metal with a serrated or notched front or broad back, for perforating paper so that the latter may be easily detached from a stub after binding, or for perforating tickets so that they may be easily detached from each other. The serrated edge is constructed with the perforators twice the length of intermediate notches. The perforator is engaged by a piece of furniture in the form, which presses and drives the serrated edge into the paper.

#### NEW MISCELLANEOUS INVENTIONS.

##### IMPROVED WATER CUT-OFF.

John G. Diem, St. Francisville, La.—This invention has reference to improvements in the cut-off for conducting the water from the roof either to the waste pipe or cistern, so as to first cleanse the water of dust, soot, etc., and then conduct the pure rain water to the cistern, and when the same is filled again to the waste pipe. The invention consists of a cut-off of circular shape, having conical supply and exit pipes, separated by a tapering partition, in combination with a centrally swinging semi-circular gate, that connects the supply pipe with either discharge pipe. The inner end of the supply pipe is of conically-tapering shape, while the discharge pipes are separated by inclined walls, that form a sector-shaped body, which extends into the cylindrical main body nearly up to the center. A centrally pivoted gate, with semi-circular side walls, is carried by the outer handle end of the gate pivot from one half of the body to the other, so as to bear on one side of the supply pipe and rest on the correspondingly inclined partition wall, conducting thus the water from the supply pipe to the waste pipe or cistern, as required, without leakage or choking, as the semi-circular space of the main body serves as a kind of regulator, and produces the even discharge of the water. The cylindrical shape of the cut-off imparts to the same a lighter and neater appearance, and renders the same more effective and reliable in use.

##### IMPROVED FLYING TARGET.

Edwin M. Leavitt, Auburn, Me.—This invention has reference to an improved flying target, which is to be shot at and used as a substitute for the wild pigeon sprung from a trap; and the invention consists of a supporting stake with an adjustable barrel having slots and a spring trap arrangement for shooting the dart-shaped target. The barrel may, by means of the stake and socket, be adjusted at any direction and angle, so as to throw the target high or low, or to the right or left, as desired. The stake is, however, driven into the ground, and the barrel clamped so thereon that the catch to which the releasing string is attached is placed toward the shooter. The target is made in the shape of a dart, with a slitted stick of wood or metal and detachable wings of paper, pasteboard, or other material, cut in any desired form. The wings of the dart-shaped target present to the shooter a full target, let it turn as it will. By pulling back the crosshead of the spring and retaining the same by the catch and inserting the target, the device is ready for use. By pulling, then, the string the target is thrown out by the spring so as to be shot at. The stick or carrier of the target may be made of spring pieces that are held by a sliding ring, or when made of steel this ring may be dispensed with, and the ends first bent inwardly, so as to be readily lifted for taking out the torn wings and inserting new wings.

##### IMPROVED STOVEPIPE ELBOW.

Greene Choate, East Saginaw, Mich.—The object of this invention is to cut the section of which the elbow is composed from a rectangular piece of sheet metal without wasting material or incurring the labor of trimming the sections after they are cut from the sheet. Another object of this invention is to place the seam of the elbow at the side of the same, instead of at the bottom, so as to prevent the pyroigneous acid or soot, which usually accumulates in stovepipes, from exuding or oozing out, there being no seam at the bottom of the pipe for such a result to take place. Blanks for the sections of four-piece elbows, as ordinarily cut, require trimming after being cut from the sheet, to give them the required curvature. The end sections of the elbow also require trimming, so that one end of the elbow shall be small enough to enter the pipe to which it is placed, and the other end of sufficient size to receive the small end of a length of pipe. A sheet of metal is cut on three similar but oppositely arranged curves. Each of these curves is composed of two arcs of equal radius. The sections cut upon these reversed curves require no trimming, but are ready to be at once formed into an elbow. The central portions of the elbow are secured together by rivets, and inside of the lines in the section the holes are made for receiving a rivet that holds the smaller end of the elbow together, and outside of the lines in that section the holes are made for receiving the rivet that holds the larger end of the elbow together. By cutting the blanks as above described, the seams in the elbow section are placed at the sides of the same, instead of at the bottom, thus preventing the pyroigneous acid from passing out. By this invention the blanks are cut in such a manner as to make the proper difference in the ends of the elbow sections, to allow one end to receive the other, this being done by making the taper half in each section only, thus avoiding all trimming and effecting a great saving of time.

##### IMPROVED UMBRELLA.

William S. Harris, Brooklyn, N. Y.—This invention relates to certain new and useful improvements in umbrella handles, and consists in making the handle with a taper, the same being either hollow or solid, and providing the same with a suitable spring attachment at the upper or thin end of the handle, which will fill and hold the runner firmly when the umbrella is raised. In order to provide for the runner fitting the upper or thin end of the handle, a bow spring is supported between two ferrules, which have wires extending between them, so as to assist in fitting up the barrel of the runner, and thus form a bearing for it equal in diameter to that part of the handle on which the runner rests when the umbrella is closed. On the bow spring there is a catch, which allows the runner to be raised; but when above, it will hold the runner, so that it cannot return until the spring is compressed by the user. It will be observed that the umbrella handle is not weakened, as those at present made are, by slitting the handle for the insertion of the spring. Consequently a stronger stem or handle, much neater in appearance, and capable of being made smaller in size, owing to no part being cut away, is produced.

##### IMPROVED WATERCLOSET.

Francis E. Kernochan, Pittsfield, Mass.—The object of this invention is to improve the construction of waterclosets in such a way as to prevent the escape of sewer gas and enable the supply of water to be regulated and controlled as may be required. The water pipe rises above the basin of the watercloset and opens into a reservoir, placed at a suitable distance above said basin. From the reservoir an outlet pipe leads down to the basin, passes in through the bottom of said reservoir, and rises nearly to its top. An inlet or water pipe enters the reservoir near its top. In the side of the outlet pipe, just above the bottom of the reservoir, is formed a hole of about half the area of the inlet pipe, so that when the water is admitted a part of the water will flow out through the hole and outlet pipe into the basin, and the rest of the water will tend to fill the reservoir. Should the valves be kept open sufficiently long the reservoir will be filled, and after that the water will flow out through the pipe as fast as it enters through the water pipe. The difficulties that may arise from the varying supply of water at different places, or at the same place at different times, may be met, either by the use of a self-filling tank controlled by a floating bulb, as at present used, or by a valve connected with a separate pipe used to supply the after-wash, so that that pipe shall be always closed when the

inlet pipe leading to the reservoir is open, and open when said inlet pipe is closed, so that the only entrance of water to the basin while the lifting rod is raised will be through the overflow pipe in the reservoir, and after the lifting pipe is lowered through the after-wash pipe.

##### IMPROVED ADDING MACHINE.

Marshall M. Smith, Kirksville, Mo.—This invention is intended to combine the advantages of an adding machine and paper weight in a cheap, neat, and convenient manner, it being reliable and durable in use, and operated with accuracy and dispatch. It consists of fixed disks with circumferential sliding and toothed rings, and of a movable unit and tens disk, operated by a thumb wheel and interior shaft, and by a sliding and eccentrically pivoted catch lever. A fixed arm with pointer or index end extends from the supporting standards, and carries a small end pinion, that is turned by each revolution of the adjoining sliding ring by a fixed lug at the zero point for one tooth, and moves the next ring forward thereby. The machine is operated in the following manner: The sliding rings are turned until the zero points connect with each other, and with the pinion and fixed stop of arm, so that the pinion will stand in line with the stop of the first sliding ring in line with the pointer. The revolving wheel and catch lever are then turned by the thumb wheel until the catch lever forms contact with the stop piece of arm, when the wheel is turned in opposite direction and the catch lever drawn in so as to take along the first ring band until the first figure to be added appears on the revolving wheel in line with the pointer. The catch lever and wheel are then turned back to the stop piece, and turned forward again until the second number appears thereon, and so on, the catch lever moving the first band and the first band moving automatically the pinion, and thereby the second sliding band, and so on, the sum total of all the numbers being finally read off at the pointer, being in line therewith. The addition of different numbers is thus accomplished mechanically in neat, quick, and accurate manner, without the least chance of making mistakes. In setting the bands it is only necessary to set the band indicating the 100 and 1,000 with the finger, as the units and tens band may be set easily and readily by the wheel and catch lever.

##### IMPROVED HOG TRAP.

Thomas C. Weaver and Harvy V. Weaver, Kenney, Ill.—The object of this invention is to furnish an improved apparatus for catching and holding hogs and stocks while being marked, branded, or having other operations performed upon them, and which shall be simple in construction, convenient in use, and effective in operation, catching the animal readily and holding it securely. It consists of a rectangular frame, the top and bottom bars of which are grooved or slotted to receive the upper and lower ends of the slides. The outward and inward movements of one slide produce corresponding outward and inward movements of the other slide. In using the device the door or gate is raised and the animal is driven into the pen, where it is secured by lowering the said door or gate. The slides are then moved a little apart, the animal puts his head through between them, when they are moved together, so as to clamp his neck and hold him until the desired operation has been performed upon him.

##### IMPROVED ADJUSTABLE SUPPORT FOR LAMP REFLECTORS.

Richmond Henry, Glassborough, N. J.—The object of this invention is to provide an adjustable frame for attaching a reflector to an ordinary lamp or gas burner. A ring, having an adjusting screw, by which its size may be varied, is fitted to any ordinary lamp collar or gas burner. Loops are attached to the sides of the ring for receiving wires which are bent twice at right angles to form a rectangular frame, which is inclined at such an angle as to bring the reflector supported by it into the proper relation with the flame of the lamp or gas burner. A socket, which receives the shank of the reflector, is drilled to receive the ends of the wires, and is provided with a set screw, which retains the shank of the socket in any position into which it may be turned. The reflector thus mounted is capable of turning in any direction within certain limits.

##### IMPROVED BOILER FOR HEATING WATER UPON OIL STOVES.

Robert E. Killip, Brooklyn, N. Y.—This invention relates to kettles in which to boil water; and the object is to obtain a very large amount of heating surface in a comparatively small space. The nature of the invention consists in a boiler which is constructed with a skirting that is extended into and below its bottom, in combination with tubes which pass through the skirting and part of the water space, and project from the interior surface of the skirting. Below the body, tubes are applied to the skirting, and arranged around it equidistant from each other. These tubes may be cylindrical or tapering, and they all project inside of the skirting a short distance, for the purpose of slightly arresting the outwardly escaping heated products, and utilizing as much of the heat as possible. The boiler is used by arranging it over the lamps of an oil furnace; or a common oil lamp may be applied inside of the skirting, when it will be found that comparatively little heat will be required to boil water in the body.

##### IMPROVED HEATING STOVE.

Alfred H. Chase, Dowagiac, Mich.—This invention relates to improvements in heating stoves by which the fuel is economized, a larger percentage of the heat supplied to the rooms, and the sweating of the stovepipes and chimneys prevented. The invention consists of a stove connected by a direct draft pipe with the outside of the room or building, and by a pipe branching off from the same with the stovepipe, the pipes having suitable dampers to keep up a draft in the stovepipe and chimney and carry off smoke, while confining the heat in the stove. A stove of a suitable construction may be used, to which cold air is supplied from the outside of the room or building by a draft pipe that passes through the floor and prevents the taking up of any of the heated air from the room. The heat in the room is thereby preserved, and no extra fuel required for reheating the air drawn off. The air is drawn by a pipe into the stove below the grate, and the stove thereby made independent of the atmosphere in the room. A draft pipe is connected with a cold air pipe which branches off from the same below its opening into the stove, and below is a damper. The cold air pipe is extended below the stove, and then in upward direction to the stovepipe, entering the same above the damper of the stovepipe. The cold air pipe is also supplied with a damper near its upper end, which is closed when the current of air is to be thrown entirely into the stove for keeping up a brisk fire therein. By changing the dampers the fire may at any moment be restored to the required briskness, so as to keep it up when supplying coal, and without drawing off any of the heated air of the room.

##### IMPROVED METALLIC SEAL.

William W. Johnson, Nashville, Tenn.—The bows or shackles of metallic seals have been usually constructed of several strands of wire twisted together in such manner that the bows have a comparatively smooth exterior, and in consequence of such construction, they may be withdrawn from the lead ball without injuring it materially, thus destroying the practical efficiency of the seal. It is the object of this invention to provide a metallic seal whose bow or shackle, although constructed as cheaply and simply as those previously used, cannot be withdrawn from the lead ball or seal proper without defacing or injuring it to such an extent as to render detection easy. The bow or shackle is formed of a central wire and an outer wire or wires, which are wound spirally around it in such manner as to leave a considerable interval of space between the respective convolutions, thereby forming a composite wire screw with widely separated threads. The ends of the bow or shackle thus constructed are inserted through the holes previously formed in the lead ball, and the latter being compressed sufficiently to close said holes and cause the lead to set firmly around the wire screw, the latter will be held so tightly that it cannot be withdrawn without seriously defacing or mutilating the ball, and thus disclosing the fact that the seal has been tampered with.

##### IMPROVED BRACELET, ETC.

Charles H. Graef, Edgewater, N. Y.—This invention has reference to improvements in that class of rubber, horn, and other articles which are

made with a natural spring, so as to return to their normal position on being applied, the improvement being intended to embellish said articles without weakening them or detracting from their ready use; and the invention consists of a bracelet, child's long comb, or other article of springy nature, having a broken-out ornamental band of suitable metal attached at the ends only, so that the band gives on spreading the article, and resumes its snugly fitting position on the article without getting torn and without injuring the article. An elegant ornamentation for such articles that return to the natural position by the spring of their material is thus furnished, which is not detrimental to the articles themselves, nor damaged by the working of the same, so that thereby the more general use of such articles is promoted by the improved appearance of the same.

##### IMPROVED WOOD-SAWING MACHINE.

John A. Chandler, Monticello, Iowa.—A treadle is pivoted to the saw-horse and attached to a frame which extends beyond the treadle, and to which the saw frame is pivoted. Stop pins are arranged for preventing the saw from dropping too low and from being thrown too far back. A spring is attached to the frame and to the saw frame for drawing the latter downward, so as to cause the saw to bear upon the wood supported by the horse. To the inner end of the treadle a spring is attached, which strikes a buffer spring at each downward stroke of the treadle. A lever pivoted to the crossbar at the back of the horse, and provided with a curved serrated dog or holder that engages the surface of the wood being sawed as the lever is drawn forward. The operation is as follows: A stick of wood is placed upon the horse and the treadle is oscillated with both feet, while at the same time the upper end of the saw frame is grasped by one hand and the lever which clamps the wood by the other. The wood is thus quickly sawed with very little exertion.

##### IMPROVED ANIMAL TRAP.

Chauncey M. Orton, Glen's Falls, N. Y.—The box of the trap, which is rectangular in form, is designed to be made of tin, so that animals cannot eat their way out. This box is divided into two compartments by a partition that slides in grooves in the sides of said box. In the partition, near one side, is formed an opening of such a size that the animal trapped for can easily pass through it. The trap is set by drawing up a sliding partition. The animal, in roaming about, sees the bait upon a wire, and in seeking to reach it enters the box, steps upon the platform, and withdraws the wire from the door, which allows said door to drop. The frightened animal, seeking to escape, passes through the opening in the partition to the bridge, which tilts under his weight, and he passes through the opening in the plate into the inner compartment of the trap, and is securely caged. The descent of the bridge raises the door, which is caught and held by the wire, and the trap is reset, the bridge returning to its normal position as soon as the animal has passed from it.

##### IMPROVED LIFTING JACK.

Samuel Barrow and David Barrow, Windfall, Ind.—This invention relates to lifting jacks which are designed for raising stumps, wagons, broken down fences, and for rolling logs, and all purposes where heavy objects are to be moved. A strong standard has a base secured to it which is adapted to receive and guide a vertically movable lifting bar, and also to receive between its open cheeks the end of a lever, which is constructed with an enlarged head, having a fulcrum pin fixed eccentrically to it, and this lever is connected to the lower bifurcated end of the lifting bar by means of a bent link. The edges of the cheeks of the standard are notched to receive the ends of the fulcrum pin, and to allow the lever to be adjusted higher or lower, as may be desired. An arm is adjustable independent of the plate or bar, and is used for raising fences and supporting them while being repaired or straightened. When it is desired to use the jack for rolling logs or turning heavy beams, the plate is detached from the jack and the cant hook is attached to the lifting bar by inserting the straight portion into the hole in the upper end of this bar.

##### IMPROVED FIRE ESCAPE.

Thomas A. Andrews, Gainesville, Tex.—The object of this invention is to provide a simple and inexpensive fire escape that cannot get out of repair, and that is always ready for use. In the pulley stile of a window frame is formed a receptacle for the rope and strap of the fire escape. This receptacle is provided with a door, which, when closed, forms a part of the stile. The hinges upon which the door swings are each provided with a stop, which prevents the door from being accidentally closed. The door serves the double purpose of closing the receptacle and of a bracket for supporting the pulley and rope of the escape. A grooved pulley is journaled in a casing that is secured to the door. This casing prevents the rope from slipping from the pulley, and also from becoming knotted or twisted. The strap is attached to one end of the rope, and is provided with a snap hook or buckle, by which it may be adjusted. The rope is of such length that both ends may touch the ground. The manner of using the escape is as follows: The window is raised above the door, which may then be opened, and when open it extends beyond the wall of the building. The person desiring to descend places the strap around the chest under the arms, and drops the free end of the rope to the ground. The escape may be operated by persons below or by the person descending. The person escaping steps out of the window, and either lowers himself or is lowered by persons from below. One person may in this manner lower a number of people. The apparatus may be placed in the wall of the building, either inside or outside, but it is most convenient when arranged in the window frame, as described.

##### IMPROVED FAUCET.

Thomas A. Andrews, Gainesville, Tex.—The object of this invention is to provide a faucet which is inexpensive in its construction, easily repaired, and efficient in operation. The body of the faucet is L-shaped, and contains a passage which is enlarged, forming a valve seat, and is threaded internally to receive a screw. A lateral oblong aperture is formed in the body just above the valve seat for the escape of liquid from the faucet. The inner end of the screw is provided with a square projection, to which is fitted a packing disk, of elastic material, which is secured to the screw by another screw. The screw that closes the faucet is provided with a handle or thumb piece, by which it may be turned, and the body of the faucet is provided with a tapering portion, which may be driven or screwed into the vessel or pipe in connection with which the faucet is used. The advantages claimed for this improved faucet over others now in use are that it may be more cheaply manufactured, is more easily repaired, and is perfectly secured against leakage.

##### IMPROVED BEE HIVE.

Aaron Dardorff, Joseph W. Stutzman, and Aaron D. Stutzman, Morrisville, Ill.—The object of this invention is to furnish an improved beehive, which shall be so constructed as to give the operator full control over his bees, and which, at the same time, shall be simple in construction and convenient in use. The front, sides, and top of the hive are permanently attached to each other, and the back is separate, being hinged at one end to adapt it to serve as a door. Bars are permanently attached to the lower parts of the sides of the main hive and may be folded in beneath the rear parts of the brood chamber, or may be turned outward to form a way for the brood chamber to be slid out and in upon. The front and rear parts of the brood chamber are permanently secured to its bottom at their lower edges, and are rabbeted upon the inner side of their upper edges to receive the projecting ends of the top bars of the comb frames, and the projections formed upon the corners of the side boards of the said brood chamber, which projections may be the projecting ends of cleats attached to the upper edges of the said sides. The sides of the brood chamber are so formed as to fit snugly between the front and rear of said chamber. This construction enables the sides of the brood chamber to be moved in or out, to adjust the size of said chamber, as may be required. The comb frames are kept at the proper distance apart by staples attached to the side edges of their top and side bars.