LOCKE'S SELF-LIGHTING GAS BURNER.

Matches are a great convenience, but their use is more or less troublesome and dangerous. Many, when they have used a match, throw it, while lighted, on the floor or anywhere, by which carelessness, undoubtedly, many fires are caused. In lighting gas jets, a match must be used on every occasion, or a taper must be employed, entailing danger in one case, and trouble and cost in the other. The lighting of gas by electricity is convenient only in halls or other large rooms where it is desirable to light many burners at the same time. All these annoyances are avoided by the simple device shown in the accompanying engraving.

Fig. 1 is a perspective view, and Fig. 2 a vertical central section. The burner can be attached to any gas pipe in place of the nipple generally used. Its peculiarity consists in having a supplementary miniature pipe, A, Fig. 2, by the side of the main nipple. This receives its supply of gas from a channel, seen at B, cut from the main supply aperture in the cock spirally and partially around its circumference. A screw, C, passes through the side of the burner under the cock and serves to regulate the amount of gas admitted to the channel, thus regulating the flow of gas according to the pressure.

When the gas is turned on to the main burner, the supply to the secondary burner is entirely cut off; but when shut off from the primary or principal burner, a small portion escapes through the auxiliary, being lighted in the instant of turning off by the flame from the main burner, in consequence of the rapid spiral of the channel cut in the circumference of the cock, which is simply a "fast" screw thread. In lighting, the jet of gas from the auxiliary tube, when the cock is turned, "jumps up" and ignites the gas from the main tube. The small tube, of course, burns gas when the main tube is not acting, but the amount thus burned is slight and proves to be far less expensive than the use of matches and other appliances for lighting gas. A cowl or cap, as seen in the engraving, protects the small jet from being extinguished by currents of air.

Patented April 7, 1868, by Richard B. Locke. Communications should be addressed to R. B. Locke, Secretary of the Self-Lighting Gas-Burner Company, at 451 Broadway, New York city.

PICTORIAL PRINTING.

In the new volume of the *Annual of Scientific Discovery* reference is made to, and an illustration is given, of an invention brought out during last year, designed for producing pictorial effects by the use of movable metal types, cast like ordinary printing types and bearing upon their faces different devices, which, by their combination, produce the desired effect. A full-page illustration, printed on landscape type, and representing the home of the Adams' at Quincy, Mass., is given as evidence of what is possible to be accomplished by this invention. The type used are each one thirty-second inch square, their surfaces either plain, blank, or lined in various directions and degrees of fineness. The two edifices, with doors, windows, chimneys, columns, and roofs, are represented in the cut before us in accurate perspective, and even the trees, foliage, clouds, and other accessories of the landscape are portrayed with a considerable degree of fidelity. The general picture presents the familiar appearance of the patterns for canvas needlework; every straight line appears as such, but the curved outlines approximate to that form by rectangular gradations.

This plan is a Boston invention, and is not yet even fully developed; but even when perfected, it is doubtful if pictures thus printed will ever equal in beauty those produced by a process, similar in principle, to the foregoing, and, like that, first made public during the past year. The latter invention is due to one Fasol, a printer in Vienna, and the art, as practiced by him, is called "Stigmatypy," from the fact that he uses only the full point, of different sizes, cast upon the same body. The variations in shade, and the whole effect is produced, as in ordinary stipple engraving, according to the proximity of the points. Both processes are yet in their infancy, and we await with interest their further development.

EFFECT OF FROST ON LARVÆ.—In a paper addressed to the French Academy, M. Reiser announces that the general belief held by farmers, that a severe frost kills noxious insects and larvæ that grub in the earth, is a fallacy, the only effect of the frost being to drive them still deeper into the earth. He found that while the thermometer stood at 5° Fah., and the ground was covered with snow, the soil at a depth of twenty inches was not influenced by frost, and below this line the larvæ were to be found; descending still further as the cold increases.

THE CONSTRUCTION OF WATCHES.

BY H. F. PIAGET.

No. 2.

A clock has a combination of wheels to mark the number of oscillations made by the pendulum. A watch is a similar combination to mark the number of vibrations made by a balance. The wheels of a clock may be impelled by a weight, and the time measured by a pendulum; but as the watch must go in all positions, neither the weight nor the pendulum can be applied to it.

The power of motion in a watch is produced by means of a spiral spring, usually called the main spring, placed in a drum or barrel, which when wound round a center will from its elasticity cause the barrel to make as many revolutions as there are turns made by the spring. Time is measured in a watch by the vibrations of a balance, which if moving in equal space, will make all the vibrations in equal time.

The escapement is the name given to that part of the watch which transmits the power from the wheels to keep up the vibrations of the balance; the escapement also prevents acceleration of the wheels, by holding them in check until the balance has completed its vibration. If the force exerted by the unfolding of the spring be equally transferred through the wheels to the escapement, and if the impulse given by the escapement to keep up the vibration of the balance be equal, then will the motion of the balance be also regular, and the watch will measure equal time. But the force of the spring is unequal—it is strongest when fully wound, and becomes weaker as it uncoils. To compensate this inequality, a cone is employed with a spiral groove, called a fusee, to which is attached the first wheel.

The wheels of a watch are thus called:—The wheel on the fusee is the first wheel; the center wheel, the pinion of which carries the minute hand; the second, or center, the one which in ordinary watches carries the second hand; the fourth, and the next, the escape wheel. In the old rack-lever watches there is one wheel less, the second hand being carried on the pinion of the escape wheel; the second hand then went around very fast, but these kind of watches are nearly out of use, many of them having been altered to the present lever escapement.

The going fusee, invented by Harrison, to make a watch continue to go while being wound up, and used in all good English watches, has an auxiliary spring, through which the force of the main spring is carried to the wheels. While the watch is being wound, a ratchet and click prevent the reaction of the auxiliary spring, which therefore continues to act during the time of winding, although the power of the main

Auxiliary Spring.

Maintaining Power, Clock and Spring.

spring is then taken off. The fusee is connected with the barrel containing the spring, by a chain with hooks at each end. In winding the watch the chain is wound off the barrel and around the fusee. When the watch is fully wound, the spring is at its greatest power, but the chain being then around the smallest part of the cone of the fusee, the influence of the spring is the smallest.

As the watch goes down the power of the spring relaxes, but as the cone enlarges its influence increases, and when the spring is down, the chain is upon the base of the cone, where the influence of the spring is the greatest. Upon the shape of the cone of the fusee, therefore, depends the quality of the maintaining power. There is usually about half a turn of the weakest part of the spring left without action to enable it to draw all the chain to the end, otherwise the watch would not run quite down; that is regulated by a click and ratchet upon the barrel arbor.

Ratchet and Click.

In some watches the ratchet and click are placed under the dial, and cannot be seen by the wearer; in others they are placed on the bar that holds the barrel, and are easily seen on opening the watch.

The fusee, or cone, can not be introduced into very flat watches. The barrel, therefore, instead of the fusee, is attached to the first wheel, by the barrel having teeth cut at the sides, and is called the going barrel.

Going Barrel.

English Stop Work.

Swiss Stop Work.

Stop works are necessary to every watch, particularly to those with chains, as to those without the chain would be almost sure to break, particularly in thick English watches. In Swiss watches, and in all with going barrels, or without a

chain, they are indispensable (to a good watch), as by them the spring is regulated as near as possible in its action; not to be too strong when fully wound, nor too weak when nearly run down. A watch without stop works, or one with imperfect ones, will be in danger of having the spring or some of the teeth of the barrel broken in winding.

If the spring is wound up too tight it is much more liable to break, and when broken, if there are no stop works, the strain of the key comes on the teeth of the barrel, and if forced will frequently bend or break them. If the spring to a going barrel be well made, and the wheels so constructed that only the middle turns of the spring are required to be in action, and not those turns of the spring in which it is at its greatest or least power, the force may be sufficiently equal for ordinary purposes; but where the fusee can be applied it is preferable and certainly the best.

The power of the spring is conveyed to the escapement through the wheels, and the arrangement is nearly the same in all watches; therefore their comparative value in this part of the construction depends entirely upon the skill of the workman and the quality of the materials. The power of the spring being equal, and the wheels and pinions properly constructed and placed correctly to act with each other, which is called "pitching the depths" (this is a term used in wheel work, and it is necessary that the wheels and pinions be placed at proper distances from each other, or there is friction, cutting, and noise in the action, which should not be in a good watch), to convey the power to the escapement, and to keep up the vibration of the balance, constitutes the essential difference between one watch and another.

A watch is described by the form of its escapements.

Several escapements, such as the verge, the vergule, the rack lever, etc., had to be abandoned. My uncle, who was one of the most ingenious workmen in Switzerland and London, and maker of musical watches and repeaters of every kind, and with whom I worked fifteen years, spent upward of five years in inventing and trying new escapements, but had to abandon the idea of making anything better. It was his opinion, and is also mine, from experience, that it will not be possible to get escapements with less friction, and that will maintain their accuracy better than the chronometer, duplex, or even lever, if properly made. Still I may be mistaken, as many things have been achieved within a quarter of a century which would then have been thought fabulous.

The balance of a watch is a wheel nicely poised upon its axis, having its greatest weight at its periphery.

A balance properly placed, with its pivots in their holes, but resting on the points or ends, would, when put in motion, revolve on its axis; but if a spring so constructed as to bend in either direction in which the balance will turn, was to have one of its ends fastened to a point independent of the balance, while the other end was attached near to its axis, an impulse then given to the balance would only cause it to move as far as the force given was able to overcome the resistance of the spring, when the resistance becomes equal to the impulse given; the balance stops for an instant, and then is driven back by the elasticity of the spring to a distance nearly double to that through which it passed in its first motion, and thus continues to vibrate until the friction and the resistance of the air bring it to rest.

A spring thus applied is called the balance or hair spring. This spring has been frequently noticed as illustrating the great value a small piece of steel may acquire from manual labor; it is perhaps more remarkable for its extreme delicacy, four thousand of them weighing scarcely more than an ounce, while the cost frequently exceeds four thousand dollars when used for fine work.

When the balance is at rest the spring is inclined neither way, this position is called the point of rest; and the motion of the balance when influenced by the hair spring, is called vibration.

The application of the balance or hair spring is the greatest improvement ever made in a watch; since it rendered a comparatively useless machine capable of going with accuracy; and now that the principle can be more easily applied, although perhaps not better understood, it offers the means of measuring time equal to a pendulum.

The first watches were made without any balance spring, but with a vertical wheel which moved the wheel backward and forward; and instead of the chain now used, there was only a piece of cord, like a very fine violin string, to convey the motive power of the main spring to the wheels. This balance spring can produce astonishingly varied effects, from difference in the length and tapering, the principle being, the stronger and shorter the spring, the quicker will be the vibrations.

The hair springs of watches are made flat on account of the small space for them to work in; but where there is room, the isochronal spring is applied. In marine chronometers for the use of ships, they are made in a spherical form; the thickness of the spring being the same the whole of its length instead of tapering, as they are easier of execution and better adapted for the regulation of time.

These remarks will not be thought too detailed if we consider that the correctness of the watch as a measurer of time

Marine Chronometer Balance and Spherical Spring.

is mostly dependent on the correct principle of the escapement and of the hair spring.

The curb, or regulator, is the part used for regulating the watch. The purpose is to shorten or limit the motion of the balance to make the watch go faster, and to lengthen it to make the watch go slower.

When a good watch has been produced, with the main spring acting with equal power from the instant of being fully wound to the termination of its time of going, the wheels and pinions perfect in all their parts, the escapement on a good principle and properly executed, and the balance spring so perfect as to make all its vibrations in equal time, even then the watch will vary in the time. It will show a variation upon every change of temperature, unless it be compensatory.

A watch may be said to be a metallic thermometer, for the slightest change in the temperature affects its going in proportion to the change; heat enlarging the balance and lengthening the hair spring, (independently of the effect produced upon all the other parts,) which will make a watch lose, while contraction from cold will make it gain. An action upon the balance, bringing the weight at its extremity nearer to the center, will cause it to gain, and the same effect will be produced by an action on the hair spring, which will either shorten its length or limit its motion; and both of these means are made use of to make watches keep equal time in different degrees of temperature.

When this effect is produced it is called compensation, and is obtained from the different degrees of expansion in metals, and for this purpose the compensating balance is applied to good watches. The compensation balance has its circumference composed of two metals, brass at the extremity and steel within; and as the rim is cut in two parts will expand or contract with every change of temperature. When heat causes the expansion of the spring and balance, it also cuts on the brass at the extremity, and causes that part of the rim which is cut, to be brought nearer the center, and

Compensation Balance.

this motion is so regulated by means of screws or weights, as to compensate for the expansion, and enable the watch to measure equal time under the different degrees of heat and cold.

But compensation balances should not be used unless the other parts of the watch are perfect, otherwise they are not so good as the plain gold or steel round rim balance. I have always found the latter kinds to keep very good time, and where the price is limited, are to be preferred, as a bad compensation balance is but a detriment to an otherwise good watch. The compensation curb is frequently applied to watches. Its use is to limit or extend the motion of the balance spring, by a self moving action caused by a change of temperature. The principle is the same as in a compensation balance, the motion being produced by the inequality of expansion in the two metals, (brass and steel,) of which it is made.

There are many who expect an accuracy incompatible with the nature of the machine; indeed, positive accuracy can never be obtained, until an unchangeable material is discovered, of which the work can be constructed.

One of the best time keepers and finely finished watches that I ever saw, was one made in Geneva, or Locle, which a friend of mine purchased in California, and I had it to clean. It had the plates and bars for the wheels made of nickel, the wheels were made of gold, it had a compensation balance, with isochronal hairspring; in short it was a *chef d'œuvre* (for a Swiss watch,) with an anchor escapement.

It is frequently forgotten that time differs in every spot east or west of the place at which the watch is set. At the present speed on railroads, two hours' traveling may make the traveller's watch show some two or three minutes faster or slower, than the local time of the place at which he arrives. In this case, the difference must be added or subtracted to avoid disappointment when travelling. It has been said "that no man ever made a true circle or a straight line except by chance," and the same may be said of any machine which measures time exactly. These remarks neither lessen the perfection or usefulness of watches. They are among the highest specimens of human ingenuity, and indispensable in the present state of society.

MANUFACTURING MINING, AND RAILROAD ITEMS.

At Denver, Col., a company has been organized to build a train-road into the mountains of South Pass, as a means for bringing into the city lumber and all kinds of building material. The plan of construction is as follows: The ties are designed to be seven feet long, round timber; the rails 8x8 wide, sawed spruce timber, 16½ feet long, let into the ties and securely keyed; track four feet wide; car wheels 18 inches in diameter, 4 inch tread, with square flange. These rails can be turned and used eight times, or can be strapped with iron when desired by the company. Small but powerful locomotives are to furnish the motive power. The estimated cost per mile is \$1,738.

English capitalists of a speculative disposition are turning their attention to the oil resources of Northern Italy. This country has been known for ages to be rich in petroleum of peculiar qualities and of a natural transparency. In Barigazzo the oil appears on the surface of small pools of water, and throughout the whole of the hills of the northern sections there are unmistakable geological signs of the existence of petroleum deposits. There are oil wells at Monte Bonello which have produced eleven tons of oil per day, and this at a depth of less than 160 feet. The Italians seem entirely apathetic about developing the oil resources, but the introduction of English capital and American machinery will make petroleum one of the most profitable of Italian industries.

The boot and shoe business of Detroit last year was very prosperous, the aggregate sales of twenty large manufacturers amounted to nearly \$6,000,000. One of the most extensive firms sold \$2,000,000 worth of goods.

A special freight train was recently started from Concord, N. H., for Salt Lake City, a distance of 2,600 miles. It consisted of twenty cars loaded with stages for the overland line to California.

According to the *Athenæum*, Mr. Galy Cazalat has invented a process to be employed in casting steel, so that tilting is rendered unnecessary. The mold is made of the greatest possible strength, and is provided in its upper part with a chamber in which a quantity of an inflammable powder is placed. When this powder is ignited an immense pressure is exerted upon the surface of the steel, the molten metal is thereby forced into every minute portion of the casting, expels the gases contained in the steel, and causes the metallic particles to be brought into the most intimate union.

In the foundry of the Port Richmond Iron Works, of Philadelphia, are three cupola furnaces, the largest of which will melt twelve tons of iron per hour. In the machine shop of the same establishment there is a planing machine capable of planing casting eight feet wide, six feet high, and thirty-two feet long; a lathe that will swing six feet long, and turn a length of thirty-four feet; and a boringmill, believed to be the largest in America or Europe, that will bore a cylinder sixteen feet in diameter and eighteen feet long.

The American Central railway, a projected air line road from New York to Omaha, has, we learn, finally assumed a definite shape, and the enterprise is to be pushed through as fast as money in abundance can do it. The entire air line will be made by a consolidation of the Allentown road to Harrisburgh, the Pennsylvania Central to Pittsburgh, the Fort Wayne and Chicago to Fort Wayne, and the American Central to Omaha. The company was fully organized at Fort Wayne, Indiana, on the 5th inst., and the road will be one of the most important now building in the United States. Its length is to be five hundred and eighty-five miles, and by its directness will shorten the route now traversed between this city and Omaha by one hundred and thirty-six miles. When the Pacific railway is completed this new road will constitute with it a grand trunk line from ocean to ocean.

The New York State Legislature, after a protracted consideration, have passed two bills securing two underground railways for the relief of this city. The first bill provides for the construction within three years of a tunnel railroad from the City Hall to Forty-second street, a distance of a little over three miles. The list of incorporators of this road embraces the names of many of the most responsible capitalists of the city, and the required deposit of \$300,000, will serve as a pledge that the enterprise will be carried through. Two additional years are allowed to carry the railway to Harlem river, and provision is made for an elevated line in case the lowness of the surface above Ninety-second street renders the construction of a tunnel impossible. The other bill passed was for the Arcade railroad, described and fully illustrated on pages 92 and 93, Vol. XVI, SCIENTIFIC AMERICAN.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

WOOD-PLANING MACHINE.—Frank Douglas, Norwich, Conn.—The object of this invention is to provide means for rendering the feed rolls more perfectly self-adjustable to planks, boards, etc., of different thicknesses. In accomplishing this object, the upper rolls are supported in a novel manner, and a new kind of adjustable gear is employed to operate them. A new arrangement is also used for applying adjusting weights to the upper rolls.

CARRIAGE COUPLING.—Ira and John S. Vanpelt, Petersburg, Va.—In this invention the use of coupling bars is dispensed with, and a carriage is made without them, which is simpler in construction, stronger, and works better, than the carriages in which such bars are employed.

SHINGLE MACHINE.—Albert Thompson, Ridgeway, Pa.—In this invention the carriages are attached by a new device, by means of which one of them can be detached and stopped for adjusting the bolt without interfering with the action of the other. The heading and pointing is also regulated by a new mechanical arrangement, and a new apparatus is employed for adjusting the speed of the carriages.

GIG SAW.—J. W. Moyer, Cherry Valley, N. Y.—This invention consists in providing the saw frame with two springs, one above and one below the saw, which operate together to give it the necessary tension, and which counteract each others' effect upon the motion of the saw, rendering its working even and uniform, and enabling it to be operated with any degree of speed.

CARTRIDGE BOX.—John Elbertson, Kirksville, Mo.—In this invention, the cartridges are arranged in a circular disk, which is hung at its center upon a spindle in a circular case. The latter is provided with a door at its lower edge, by which its cartridges are taken out. The disk carries the percussion caps, also, which are taken out through a port in the upper side of the case. The disk and case are so constructed and arranged that the cartridges and caps will always present themselves at the proper place to be handled.

DOOR STOP.—A. G. Stevens, Hillsboro', N. H.—The object of the door stop embraced in the present invention is to obviate any injury to the sides of rooms by the striking of the door against the same when opening wide, and for this purpose this invention is a newly constructed and arranged stop applied to the door, which, by the opening of the door, will be thrown into position to prevent its striking against the side of the room and thus obviate any injury thereto.

WATCH.—Charles S. Moseley, Elgin, Ill.—This invention relates to the manner of securing or holding the outer end of the hair or balance spring to the watch movement, and it consists in the construction of a stud carrying hair spring, of an arm or extension piece to the bridge plate for the balance wheel, and of a set screw or screws, whereby the adjustment and attachment of the hair spring can be secured with accuracy and it can be always brought to the same position.

RAILROAD SWITCH.—Adolph F. Ballas, Pottstown, Pa.—The many accidents which occur through the switches now in use have led to the invention by me of a switch that in itself will be sufficient to guard against accidents, however careless or neglectful the switchman may be, and by the present invention such a switch is obtained, the principle of the switch consisting in arranging in such a manner as to be self acting through a counter weight suitably applied thereto.

ANTI-FRICTION JOURNAL BOX.—Patrick S. Devlan, Hudson City, N. J.—This invention has for its object to furnish an improved anti-friction material for journal boxes so that the said anti-friction material or part of the journal box may be conveniently replaced when worn by fresh material.

CORN PLANTER.—D. A. Kershner, Elliotstown, Ill.—This invention has for its object to furnish an improved corn planter which shall be so constructed, and arranged as to drop the corn, cover it and mark the place in which the corn is planted so that the corn may be conveniently planted in the row.

SAUSAGE MEAT CHOPPER.—Charles Welte, Frankford, Pa.—This invention has for its object to furnish an improved machine for cutting or chopping sausage meat which shall be simple in construction, easily operated, and effective in operation.

HARROW.—John Rankin, Taunton, Mass.—This invention has for its object to furnish an improved harrow, simple in construction, easily operated, and effective in operation, and which will do its work better and more thoroughly than the harrows now in general use.

SPOOL STAND.—Nicholas P. Clarke, Central Falls, R. I.—This invention relates to a combination of a revolving spool stand, needle case, and thread cutter, whereby needles may be threaded directly from the spools on the stand and the thread cut of any desired length.

STEAM VALVE.—William Wilson, Galesburg, Ill.—This invention relates to a method of constructing the slide valve of steam engines, whereby double openings are given both at steam and exhaust ports.

BEEHIVE.—James Wash, Mt. Stirling, Ill.—This invention relates to improvements in beehives, the object of which is to provide a hive that shall effectually prevent millers, moth and other insects from entering the same, and at the same time provide a hive having good ventilation, and which is easy of access to remove the boxes of honey.

BUCKLE.—John A. Mashmeyer, Beardstown, Ill.—This invention relates to a buckle designed more especially for harnesses but capable of very general application. The object of the invention is to obtain a buckle which will admit of the parts it connects being readily attached together and detached and also readily taken up and let out, and one which will not abrad or injure the parts connected by it in any way whatever.

COMBINATION TOOL.—James Swan, Seymour, Conn.—This invention relates to a combination tool, whereby two tools such, for instance as a screw driver and a gimlet, bradawl, corkscrew, or other similar tools may be combined. The invention is an improvement or a further carrying out of the principle on which the pocket or portable corkscrew is made.

WHIFFLETREE HOOK.—Francis W. Beckwith, Westmoreland, N. Y.—This invention consists of the combination of the thimble and spring tongue for obtaining a more safe and convenient hook for whiffletrees.

PEN AND PENCIL CASE.—Wm. Maginn, New York City.—This invention consists in the employment of a cylinder of whalebone between the metal ends of a pencil case, whereby it serves to inclose the metal barrel containing the mechanism for protruding the lead holder; and simulates the appearance of the hard rubber heretofore used.

CONCRETE BLOCK PRESS.—J. H. Wirt, Delhi, Ind.—This invention relates to the pressing of concrete blocks for building purposes. It consists of a simple and effective arrangement of levers and toggle joints for actuating the press block together with other devices perfecting the whole.

FRUIT CRATE.—Truman Mabbett, Vineland, N. J.—The nature of this invention relates to the packing of fruit for transportation and consists of a crate composed of slats with spaces between each slat, the said crate also containing an inner or lining crate together with a spring bottom.

FENCE POST.—P. McDuff, Weston, Mo.—This invention relates to an improvement in fences and consists of an upright plank secured to a bottom cross piece and brace and having the horizontal planks composing the fence panels nailed to the upright plank.

LIFTING JACK.—G. H. Alger, Ames, N. Y.—This invention is an improvement on the lifting jacks as heretofore made and is designed more particularly for lifting thrashing machines when the rear wheels of the same are to be withdrawn to lower the rear of the machine to the ground for the operation of thrashing.

RUDDER GEAR.—C. T. Rideout, Boothbay Harbor, Me.—The nature of this invention consists in the employment of a traversing segment having teeth which engage with the teeth of a disk keyed to the rudder head, whereby the tiller can be made shorter and take up less room in its travel across the deck, together with a device for securing the rudder in any desired position.

SCAFFOLD BRACKET.—Samuel D. Van Felt, Anderson, Ind.—The object of this invention is to provide a firm point of attachment on the roofs of buildings for the scaffolds used in shingling or repairing the same. It consists of devices for clawing into the shingles of the roof and supporting the plank or scantling of a scaffold.

TOBACCO SMOKING PIPE.—Henry R. Robbins, Baltimore, Md.—In this invention the pipe, which is so small that it can readily be carried in the pocket, is provided with an improved apparatus for passing the smoke through water, and for preventing the water from escaping into the stem or the bowl, and is so constructed that it can be readily taken apart for cleansing it.

TOBACCO HAND TYING MACHINE.—David C. Dellinger, Russellville, Ohio.—This invention is a simple, cheap, and easily operated machine for tying rolls or hands of tobacco, whereby the operation is greatly facilitated.

RAILROAD SILL AND CHAIR.—Jasper Snell, Pottsville, Pa.—This invention relates to an improved railroad sill and chair.

KNIFE FOR REMOVING HIDES AND SKINS.—S. J. Patterson, Bridgeport, Conn.—This invention has for its object to furnish an improved knife, designed especially for butchers' use in removing the hides and skins of animals, which shall be so constructed and arranged as to guard against injuring the skins and hides by cutting them during the process of removing them from the animals.

WASHING MACHINE.—Milton F. Wickersham and Ellisha Roush, Springfield, Ill.—This invention has for its object to furnish an improved washing machine, simple and durable in construction, which will not wear the clothes and which will be easily operated.

SCOURING AND CLEANING INSTRUMENT.—V. A. Hacker, Knoxville, Tenn.—This invention has for its object to furnish an improved instrument for use in cleaning and scouring floors, stairs, ceilings, windows, etc., which shall be simple in construction, convenient in use, and effective in operation.

HOE.—G. H. Owens, Maysville, Ky.—This invention relates to a method of fastening a hoe to the handle, whereby it is made much more useful and durable than hoes made in the ordinary manner, and the invention consists in securing the hoe to the handle by a tapering ferrule.

VENTILATOR FOR HATS.—George Deas, New York City.—This invention relates to a device which is applicable to all kinds of hats, and consists in attaching to the inside of the hat elastic and adjustable bands, or rings, formed of vulcanized rubber, or other suitable material.

TIGHTENING WAGON TIRES.—S. W. Corbin, Vallonia Springs, N. Y.—This invention relates to a method of setting or tightening the tires of wagon wheels, when they have become loosened by use, or from any other cause.

VENTILATOR.—W. O. Crawford, North Star, Pa.—This invention consists in confining within a case or cabinet of suitable size, one or more air bellows, which may be operated by clock work, propelled by a spring or by a weight, the said clock work or gearing being placed within the case.

SICKLE DRIVING APPARATUS.—George G. Lyman, Independence, Iowa.—This invention relates to an improved mechanism for driving the sickles of reaping and mowing machines, and Indian corn harvesters.

FASTENING FOR FURNACE DOORS.—P. E. Shear, Saugerties, N. Y.—This invention relates to a fastening for furnace doors, whereby doors for this purpose may be tightly secured in a closed state and very readily opened. The invention in the present instance is applied to a door fitted in a mouth-piece provided with water passages to admit of a current of water passing through to obviate the rapid burning out of the door and mouth-piece; but the invention is applicable to doors fitted in the ordinary frame or mouth-piece.

BEEHIVE.—A. F. Cobb, Chapel Hill, Mo.—This invention consists in constructing a beehive of metal, and coating the same internally with plaster of Paris and beeswax, whereby the ravages of the moth, so destructive to bees, are fully guarded against, and at the same time a very economical and durable hive obtained, and one which may be kept well ventilated at an even temperature, or warm in winter and cool in summer.

MACHINERY FOR AUGERS AND BITS.—James Swan, Seymour, Conn.—This invention relates to a machine for upsetting the tips of curved or gouge-like augers and bits.

INDEXING BOOKS, LEDGERS, ETC.—James H. Swindell, Camden, N. J.—This invention relates to a method of indexing books, ledgers, etc., so that with two or three turns any desired page can at once be found. The invention consists in subdividing by means of notches such pages which are found by means of the ordinary notches that indicate the capital letters, or the hundreds or thousands, as the case may be.

CORN PLANTER.—Aaron Armstrong, Gillespie, Ill.—This invention relates to a corn planter of that class which is mounted on wheels, and on which the driver rides. The invention relates to a new and improved mode of raising the furrow shares out of the ground, and in an improved mechanism for operating the seed distributing device.

STAVE JOINTER.—Hiram S. Wiley, Madison, Ind.—This invention consists, 1st, in the arrangement of a movable circular saw for jointing staves, which traverses in a downward curve, corresponding with and conforming to the curve in the stave. The guides which conduct the saw forward and backward are true arcs of circles and concentric with the driving pulley over head, so that the belt is always kept tight at any part of the travel of the saw frame along its guides. 2d, In a slight lateral curve given in the said guides, whereby a light uniform curve is left in the edge of the stave, which adapts it more readily to the bilge requisite in a cask or barrel. 3d, The arrangement of the curved guides, toothed racks, and the connections for producing the forward and backward movement of the saw frame and saw.

EXHAUST FOR MILLSTONES.—David Baird, Bloody Run, Pa.—The present invention is an improvement upon the apparatus for which a patent was granted to the same inventor Dec. 2, 1867. The improvement consists in providing means for saving any dust or fine flour which may occasionally be taken up by the exhaust, and for carrying off the condensed steam and moisture.