

EXPERIMENTAL BOILER EXPLOSION.*

Mr. D. T. Lawson, of Wellsville, Ohio, as our readers know, has been conducting experiments with a view to determining the nature of the causes of the explosion of steam boilers, and as a result of these experiments he maintains that his original theory of boiler explosions is correct.

He believes that water raised to a high temperature, when confined and under pressure, will burst into steam when the pressure is removed from its surface; and if the exploding water meets resistance, as in a closed boiler, the effect of the concussion will be greater than the regular steam pressure.

For his experiment, Mr. Lawson had a plain cylinder boiler made in the best manner, of the best iron. It was six feet long and thirty inches in diameter. Its heads were of three-eighths inch flange iron secured by a one inch stay rod running from one head to the other. The shell was of three-sixteenths iron.

The boiler was set in an arch and connected by a pipe with a closed cylinder, into which steam was admitted to suddenly relieve the surface of the water in the boiler from pressure. A first class steam gauge was placed in the bomb-proof and connected with the boiler by a pipe about forty feet long. The valve, controlling the escape of steam from the boiler to the cylinder, was arranged to be operated by a cord from the bomb-proof. The boiler was filled with water eleven inches above the fire line, and the fire was supplied with extra fuel in the form of petroleum, the supply of which could be controlled from the bomb-proof. After a few preliminary experiments the final and successful one was tried on the 16th of June last.

Steam was raised to 260 lb., when the valve was opened, the index of the steam gauge fluctuated some 30 lb., showing an extraordinary disturbance in the boiler, and nothing more. A repetition of this with steam at 300 lb., at 335 lb., and at 365 lb., produced the same results. But when the valve was opened at a pressure of 383 lb., the boiler exploded with a loud report, scattering fragments of its shell, furnace, and stack in all directions. The stone foundations were driven several inches into the ground.

It is stated that there were evidences that the plates were rent at least four times transversely and torn open the entire length. One piece had a hole blown through it about the size of a man's hand.

It was estimated that the boiler would have borne a continuous pressure of over 700 lb. per square inch. There seems to be ample evidence that it required an extraordinary force to effect the destruction of the boiler.

We understand that Mr. Lawson has some further experiments in contemplation which he expects will furnish additional proof of the correctness of his position.

The Elias Magneto-Electrical Machine.

The magneto-electric machine of Signor Paccinotti, which forestalls the "Gramme ring" by several years, has been brought into fresh repute by the discourse of M. Govi delivered at the Electrical Congress, and by its exhibition in the Italian Section of the Exposition at the Palais de l'Industrie

Close beside it, however, in the Dutch Section, is another old machine which has not received all the attention which it deserves. Indeed it does not appear to have been on view all the time the Exhibition has been practically complete. This apparatus was invented by Herr Elias as far back as 1842, and as it contains a somewhat similar ring to that of Gramme, it may be said to have anticipated Paccinotti to a certain extent. It consists essentially of two concentric rings of soft iron, each about one inch and a quarter broad and half an inch thick, and wound with gutta percha coated wire in six sections. The outer ring is the inducing electro-magnet, which is fixed, and the inner ring is the revolving armature, which is mounted on an axle which carries a slip commutator with contact rubbers of copper after the plan now so universally adopted in dynamo-electric machines. There are six knobs or teeth projecting inward from the outer iron ring and serving for magnetic poles, in front of which the armature coils revolve. The wire is wound continuously on the outer ring, but in the reverse direction in each of the six succeeding sections. This arrangement is designed to make the projecting poles alternately positive and negative. From opposite diameters of this ring a connecting wire runs to the commutator, and connects to three of its six slips alternately. The result is that as the inner armature revolves the alternating currents generated in its coils are led off by the wires connected to the copper rubbers as

current; for the brush which draws a positive current from one slip also draws a positive current from the next, because the slips are alternately connected to coils on opposite sides of the ring, and passing in front of opposite poles of the electro-magnet.

The machine is exhibited by the Ecole Polytechnique of Delft, and is accompanied by a book on the apparatus, written by its inventor, and published at Haarlem in 1842.

Both its author and printer are now dead, and no other copy is known to be in existence. It contains a very good engraving of the machine as it stands, and we should have liked to reproduce this diagram, but the book is considered

MECHANICAL INVENTIONS.

An improvement has been made in double oscillating engines, in which two vibrating pistons, attached to separate rock shafts in axial line with each other, are arranged within sector-shaped chambers, and carry crank arms on the outer ends of their rock shafts. Attached to these arms are rods which serve to reciprocate slides, that work in suitable slideways, and have pivoted to them rods which are connected with cranks on the driving shaft of the engine. This forms a very compact and efficient engine, and is the subject of a patent recently granted to Mr. Robert L. Stevens, of Albany, Oregon.

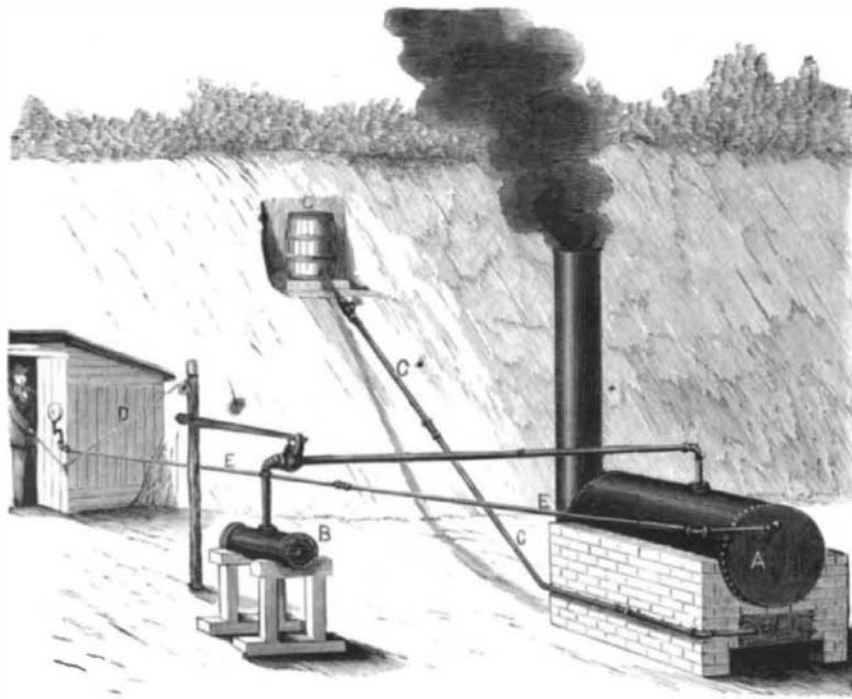
An improved stop motion for warping machines, which allows the winding of single or double threads, and will insure stoppage of the machine, has been patented by Mr. John B. Greenhalgh, of Blackstone, Mass. This invention is an improvement upon a former invention by the same party. The improved devices are fitted between the cylinder and bobbin stand of the machine. In operation the threads pass from the bobbins, through guides, to and through eyes of fallers, and through a vibrating guide to the beam on the cylinder. The fallers are thus held up out of reach of a rod that is constantly vibrated. A belt shifter is set to hold the operating belt to the fast pulley, and a latch-engaging lever retains the shifter. In case any thread breaks, its faller, being thus released, drops into the path of the vibrating rod, and the rod, by coming into contact with said faller, moves a bar to which the fallers are pivoted, and which projects upward from a shaft that, in thus being partially turned, releases the belt shifting mechanism, and causes the belt to be thrown on to the loose pulley.

Mr. Peter McCourt, of Grand Haven Mich., has patented an improvement in loose pulleys, whereby the rattling noise usually common to such devices, and which is consequent upon the wearing of their bearings, is avoided. The invention consists in a pulley, which operates as a loose one, rigidly mounted on a shaft having a bearing in its hanger, and having its one end fitting loosely on a box that is loosely mounted on the end of the shaft on which the driving pulley is mounted, so that the loose pulley will not revolve loosely on its shaft, but the independent shaft of this pulley will rotate in its bearings. The loose box in which the adjacent ends of the two shafts have a bearing remains stationary.

A simple but serviceable improvement in harrows has been patented by Mr. John H. Stokesbary, of Aurora, Neb. This invention consists in making the tooth bars of the harrow square with the perforations for reception of the shanks of the teeth passing diagonally through them, and securing the harrow teeth by upper and lower notched or angular washers receiving opposite angular portions of the bars between them, said washers being secured on the teeth against the bars by nuts on the tooth shanks above the bars and shoulders on said shanks below the bars, and serving to strengthen the bars where they are weakened by the perforations for the teeth, and to prevent the said bars from being split by the side pressure of the teeth.

Mr. Kittil Anunsen, of Winchester, Wis., has patented an improved turbine water wheel. This invention consists of a vertical circular case containing a horizontally revolving water wheel having inclined buckets, and containing above said wheel a fixed circular platform having a circle of inclined tubes inserted through it near its periphery, which tubes extend downward to deliver water into the buckets; and it consists, further, of a movable circular disk or cut-off covering the face of the tube platform, and having a circle of inclined apertures corresponding with the tubes, which cut-off is capable of being turned about its vertical axis, by any suitable mechanism, for the purpose of closing the tubes or of bringing the apertures in coincidence with them. Means are also provided for clamping the cut-off disk down upon the tube platform and holding it immovable thereon in any desired position, and for releasing it when it is necessary to adjust the cut-off. This makes a cheap and effective water wheel.

A very useful attachment to printing telegraph instruments, in the shape of a tape supporter, has been patented by Mr. Edward J. McLoughlin, of New York city. The object of this invention is to provide a device especially applicable to stock printing telegraph instruments for supporting and displaying the tape as it runs from the instrument and thereby preventing its disarrangement. The device consists of a shallow trough within and along which the tape passes as it is run from a stock or other printing telegraph instrument. This trough is constructed at its one end to admit of its ready attachment by a thumbscrew to the edge of the table on which the instrument sits, and is provided at or near its outer end with a transverse rod arranged to prevent the



LAWSON'S EXPERIMENTAL BOILER EXPLOSION—ARRANGEMENT OF BOILER.

so rare and interesting that it has been taken away for purposes of translation.

Remarkable Lathes.

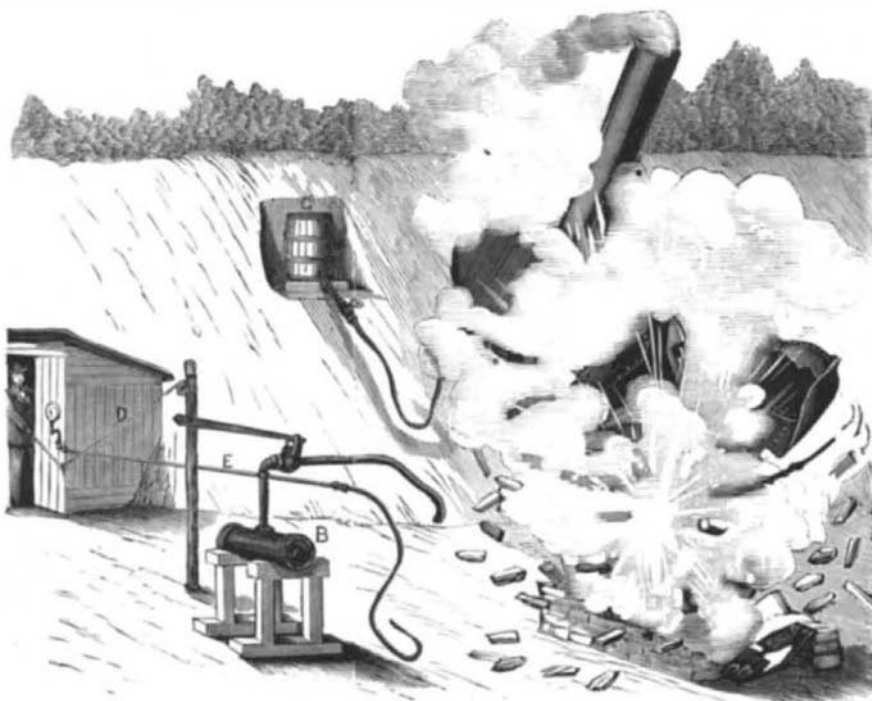
The London Iron Trade Exchange has printed a paper contributed to the Iron and Steel Institute by Colonel Maitland,



FRAGMENTS OF THE EXPLODED BOILER.

Superintendent of the Royal Gun Factory, at Woolwich, Eng., in which appears the following in relation to the gun turning lathes:

"The very nature of the manufactures in the Royal Gun Factory necessitates the turning of very large and very heavy masses. Lathes have therefore been designed and completed in this department remarkable for magnitude and power. They can deal with weights up to 200 tons, and



LAWSON'S EXPERIMENTAL BOILER EXPLOSION.

* In SUPPLEMENT 313 will be found an essay by Mr. Lawson in which he gives a detailed account of this experiment, and sets forth the principles he claims to have discovered.

are sufficiently powerful to reduce by six inches at a single cut the diameter of a 12-foot tube. These lathes have the following dimensions: 6-foot centers, 60-foot beds. There are nearly 200 tons of material employed on each of them, and the maximum power of their gearing is 150 to 1."

tape, as it is handled, from being disengaged from the trough.

A valuable improvement in ore roasting and chloridizing furnaces, especially designed for working gold and silver ore, has been patented by Mr. Robert A. Nevin, of Silver Cliff, Col. The ore to be operated on is first fed into the higher end of an inclined revolving cylinder or furnace, and passing through said furnace is exposed to a gradually increasing temperature as it approaches the fire box of the furnace, whereby said ore is partly or wholly desulphurized. From the lower end of this furnace the desulphurized ore falls, through an inclined passage or chute in the flue which leads to the chimney, into the higher end of a second inclined revolving cylinder or furnace, and as said ore passes through said chute, chloride of sodium is introduced to mix with it and to fall with it into the second cylinder, down through which the mingled ore and salt pass, subject to a gradually increasing temperature, whereby the metallic portions of the ore are chloridized, and the ore is ready for subsequent lixiviation or amalgamation. By desulphurizing the ore before the application of the salt, the metallic portions of the ore and the chlorine of the salt more readily and thoroughly combine, thereby effecting a saving of the salt and of the metals, and, by the passage of the ore from one furnace into the other being continuous, the ore does not become cooled in the operation.

A simple but apparently practicable and effective method of holding underground telegraph wires separate from each other, and properly insulating and protecting them, has been patented by Mr. John B. Morgan, of Kansas City, Mo. In this improvement a succession of metallic boxes, preferably of rectangular form and open at both ends, are arranged in trenches at the requisite depth beneath the surface of the ground. These boxes are formed with outwardly extending flanges along their upper edges and at their ends, which flanges are longitudinally grooved for holding the leaden gaskets or seals with which covers are sealed or jointed to said boxes and with which the boxes themselves are jointed to each other. The covers are scarfed at their ends to form overlapping joints with each other, and are provided with gates for pouring in the molten lead to seal them. Before placing on the covers, however, the boxes are filled with a series of longitudinally grooved boards mounted one upon the other, and having the telegraph wires arranged within their grooves, each board as it is put in place, commencing with the lowermost one, and the wires contained in its grooves, being smeared by a brush with melted paraffine or wax. This thoroughly insulates the wires and acts as a seal between the surfaces of the boards.

Messrs. John E. Chamberlain and George W. Kemp, of Charleston, W. Va., have patented certain improvements in rope railways. This invention relates to inclined rope railways, in which coal, earth, or other material is conveyed from an elevated to a lower point in cars or baskets suspended from a pair of wire cables stretched between the receiving and discharging points at proper tension, the descending loaded car or basket on one cable causing the ascent to the loading point of the empty car on the other adjacent cable. In rope railways of this class, as previously constructed, no means were provided for preventing the bellying or sagging from the main wire cables of the check ropes connecting the suspended cars and the winding drum, which sagging would quite overcome the gravity of the descending loaded car when at a point opposite the ascending car on the adjacent cable and bring both cars to a stop, and consequently compel the use of power other than the gravity of the loaded car to lower the latter to the discharging point. This invention consists in a method of preventing the sagging of the check ropes and thereby dispensing with an auxiliary power, by supporting the check ropes on independent clevises on the main cable. These clevises are flexibly connected, whereby they will spread apart to support the check ropes as fast as the latter unwind. A chain connection is preferred for this purpose. Both of the inclined main cables of the railway are similarly provided with these traveling clevises. The invention also consists in a combination with the car having a hinged bottom, supported by a sliding locking bar and catch, of a bumper at the lower end of either inclined cable, for the bar to strike and release the car bottom and whereby the contents of the car are automatically dumped. These are valuable improvements.

Mr. Charles W. Dean, of Taunton, Mass., has patented an improved cut-nail machine. This machine is more especially designed for making hooked nails, but is also adapted for making nails of various other shapes. When in operation the nail plate is fed by hand or otherwise over a bed knife. A cutting jaw then rocks downward, and with its knife cuts a nail blank, which is instantly gripped between the end of a moving die and a stationary bed die, and is held until it is headed by a movable header. The cutting jaw is provided with an offset carrying a horn, and the heading lever has also a horn. These two horns are connected by a pin which is supported at its ends in socket boxes, of which the one in the cutting jaw horn is adjustable in an elongated slot, to change the throw of the heading lever. As the cutting jaw rocks upward the heading lever is drawn inward until the point of the header is opposite the nail to be headed, when the horn of the cutting jaw tilts upward also, and by means of the connecting pin rocks the heading lever sidewise so as to bring the point of the header to bear with pressure upon the nail end. The operating mechanism is simple and not liable to get out of order,

and every necessary provision is made for removing and replacing the principal working devices, also for changing certain parts to make nails of various kinds.

PROPOSED NEW SYSTEM OF WATERWORKS FOR CHICAGO.

[Continued from first page.]

a combination consisting of a greater number of smaller pumps, each arranged to follow at equal distance. It is everywhere conceded that to obtain the best result from fuel, an expansion of steam varying from four to six times must be practiced.

"Where, as in the case of moving water, the load or resistance is constant, expansion of steam upon a direct acting piston is not practicable. Where the load is elastic and the character of the work to be performed is such as will admit of varying periphery speed, the theoretical economy of expanding steam will be partially realized in practice.

"The speed of pumping machinery should be comparatively slow, and the design should be selected with a view to maintain a uniform flow through the receiving and discharging mains. Many efforts have been made to utilize the principle of expansion of steam in pumping machinery, but so far without success.

"The beam pump, with steam and water cylinder at either end, and with intermediate crank shaft and prodigious fly-wheel, was expected to meet all demands; but in this design the fact that, to reproduce in useful work the extra pressure given to the piston in the commencement of the stroke, an acceleration of speed must be given to the fly-wheel, was overlooked, and it has been found advisable to disengage the expansion gear on this type of pumping engine.

"The compound or double cylinder expansion is the latest effort, yet as the terminal pressure must be equal to the load, and not being provided with reciprocating rotary motion, it is difficult, in fact impossible, to discover any advantage in this complicated combination. By expansion of steam, is meant that when the boiler pressure has followed the piston, say, one-fourth the length of the cylinder, communication with the boiler is cut off and the piston is impelled by the expansion or diminishing pressure, which, providing the boiler pressure be 100 pounds, will give a terminal pressure of 25 and an average 59 pounds. If the load is greater than the terminal pressure is capable of overcoming, the machine will stop. If there be rotary motion, but insufficiently charged by acceleration, it will also stop. If there be rotary motion of sufficient weight and sufficiently charged by acceleration to compensate for the diminishing pressure on the piston, the economy of expansion will be overbalanced by the power expended in acquiring acceleration.

"When the driving engine is permitted to make a greater number of strokes per minute than is being made by the pumps, the varying periphery velocity of the engine occasioned by the varying pressure on piston when working under a high rate of expansion will be inappreciable on the pumps, thus practically permitting a realization of the economy of steam expansion."

Mr. Golding's tender to the Commissioner of Public Works provided for ten single acting plunger pumps 30 inches diameter and 4 feet stroke. The pumps will be driven by spur wheel and pinion from a continuous shaft. The pinion will be permanent on the driving shaft, while the spur wheel will revolve loose upon the pump shaft and so arranged that the pump may be started and stopped at the will of the operator. The pumps will be placed in a continuous line and connected to the pinion on driving shaft in a division of ten. The pinion shaft will be connected by coupling at either end to two duplicate engines, only one of which need be connected, yet the connections will be such that either or both may be made to operate at the same time. The pump connections will be so arranged as to receive water from a receiving main which will be arranged to pass in line with the pumps, and the discharge will be arranged in like manner. The pinion will be geared one to four with the pump so as to allow the driving engine to make four revolutions while the pump shaft makes one. This combination will be capable of supplying fifteen million gallons in twenty-four hours with seven and a half strokes per minute of pumps and thirty revolutions of driving engine.

With the pumps making fifteen strokes per minute, and the two driving engines connected and making sixty revolutions per minute, will supply thirty million gallons in twenty-four hours continuously, and will do the same with one engine by allowing the steam to follow sufficient.

The engines will be furnished with adjustable cut-off or expansion motion. Steam will be supplied by three batteries of boilers, consisting of three double flue boilers, 26 feet long and 42 inches diameter, to each battery, and furnished with the usual approved connections. Each battery will be furnished with an independent feed pump of the beam and balance wheel type. The material and workmanship of the boilers will be of the best, the mountings and appurtenances will be the same as is usual and proper in such combinations. The steam and water connections will be arranged with a view of concentrating the steam upon either engine and of conveying the feed water from either feed pump to either battery of boilers.

The pumps are to be of the most primitive and simple design, consisting of a bucket plunger and a hollow base containing ordinary suction and discharge valves. The plunger has a cross head projecting through guides attached to the top of the pump, and having at each end a connecting rod carried by a crank on the shaft below.

In our engraving the larger view shows the complete sys-

tem. Fig. 2 is a vertical transverse section of one of the pumps; Fig. 3 is a plan view; and Fig. 4 is a vertical section in the direction of the shaft.

The cranks of the several pumps are arranged relative to each other, so that they occupy different positions in the circle. This arrangement renders the flow of water continuous, and brings a practically constant load on the engine, enabling power to be applied to pumping as advantageously as to steam propulsion or manufacturing.

The material, workmanship, appurtenances, and general arrangement of the boilers will be made to conform to the United States Government inspection. The workmanship and material of engines, shafting bearings, and pumps will be in every particular first-class.

DECISIONS RELATING TO PATENTS.

United States Circuit Court—Southern District of New York.

LORILLARD & CO. vs. DOHAN, CARROLL & CO.—TOBACCO PLUG PATENT.

Reissued Letters Patent No. 7,362, dated October 24, 1876, granted to Charles Siedler upon the surrender of original Letters Patent No. 158,604, dated January 12, 1875, for an improvement in plug tobacco.

Wheeler, J.:

The decisions in *Lorillard vs. McDowell* (11 O. G., 640) and *Lorillard vs. Ridgeway* (16 O. G., 123) upon the question of the identity of the reissue with the original affirmed.

The force of English letters patent as references are overcome by evidence showing that the domestic patentee made the invention before the date of the filing of the foreign specification.

The use of screws, nails, coins, and other similar things pressed into the surface of the plugs at certain stages of the manufacture to identify some particular plugs to the manufacturers themselves, and not to go out into the market with the plugs, does not anticipate a mode of marking and identifying each separate plug of tobacco as being of a particular quality, origin, or manufacture, by tin labels or tags, having a desired inscription upon them, and prongs extending backward from their edges, pressed into the plugs in the last processes of manufacture, with their faces even with the surface of the plugs, where they would be held by the prongs and the surrounding tobacco.

Decree for injunction granted.

United States Circuit Court—Southern District of Ohio.

WATKINS vs. CITY OF CINCINNATI.—LAMP BURNER PATENT. Matthews, Cir. J.:

Reissued Letters Patent No. 7,706, being a reissue of patent granted Louis Fischer, March 30, 1869, for improvement in vapor burners, *Held* valid and infringed by burners known as "Globe burner" and "Champion burner."

The Fischer patent held to cover vapor burners having a tube or passage arranged to conduct a portion of the oxygenized vapor from the mixing or gas chamber to a point below where the commixture takes place, in order to heat the fluid in the lower part of the chamber.

Various prior patents distinguished from the Fischer and held not to embody the invention described and claimed in it.

United States Circuit Court—District of Connecticut.

FITCH et al. vs. BRAGG & CO.—SNAP HOOK PATENT.

This is a bill in equity founded upon the alleged infringement by the defendants of Letters Patent granted May 16, 1865, to Charles B. Bristol and others, assignees of said Bristol, for an improved snap hook. The patent is owned by the plaintiffs.

Shipman, J.:

When the claims of a patent are susceptible of various meanings, that construction will be adopted which, in view of the state of the art, limits the patentee to and gives him the full benefit of the invention he has made.

The general terms and sometimes special words in the claims must receive such a construction as may enlarge or contract the scope of the claim, so as to uphold that invention, and only that invention, which the patentee has actually made and described, when such construction is not absolutely inconsistent with the language of the claim. (*Estabrook vs. Dunbar*, 10 O. G., 909.)

When there is a new and beneficial result attained by a new arrangement of the parts of a combination, there is a new combination, although the action of certain elements may remain unchanged.

When in a snap hook the claim was for a combination of spring and recessed tongue, the recess being so located that by reason of the new location of the spring the hook was made cheaper and easier to clean, *Held* that it was immaterial whether the action of the spring had been improved or not, provided that there is a benefit which is the result of the new combination.

Effects of Pilocarpin on the Color of the Hair.

Dr. D. W. Prentiss, of Washington, D. C., gives an account of a remarkable change in the color of the hair from light blonde to black, in a patient while under treatment by pilocarpin, the case being one of pyelo-nephritis; the other being a report of a case of membranous croup, treated by pilocarpin, in which there was also a slight change in the color of the hair.