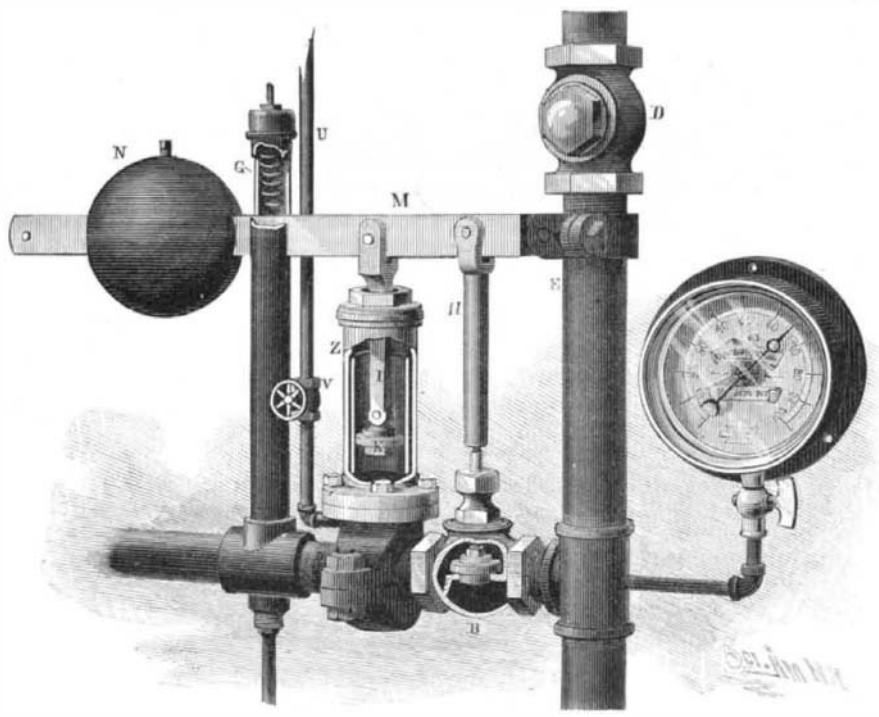
PNEUMATIC PRESSURE RELIEF GOVERNOR.

The design of this air governor is to meet a well known want, namely, that of relieving an air compressor, worked by belt power, or otherwise than with steam direct, from the power used in compressing the air, when it would otherwise compress more air than is wanted for working purposes, thereby saving all the power now expended in compressing such surplus air, which in many cases amounts to 50 or 75 per cent of the power really necessary.

This machine consists in having a branch pipe, O, attached to the upright or discharge pipe, E, in which pipe is a relief valve, B, which is operated by the rod, H, which is attached to the lever, M, to which is connected a piston rod, I, and piston, K, working in an air cylinder, Z. Also to the lower side of the cylinder is a pipe, U, and valve, V, which conveys the air from an air receiver into the air cylinder, Z; this air operates to raise the piston and lever, M, on which is a weight or ball, N, which is placed on the lever so as to balance the maximum pressure of air needed for the work to be done. The check valve, D, is placed in the discharge pipe, E, so that the compressed air shall not return and escape through the relief valve, B, when it is open.

The operation of the governor is as follows: When the compressor is at work, it forces the compressed air through the check valve, D, and discharge pipe, E, into the receiver, until the air is compressed to, say, one hundred pounds pressure per square inch. Now, this pressure applies (through pipe, U, and valve, V) under the piston, K, and this pressure is balanced by the weight, N, and lever, M; but when the pressure rises three or four pounds above the working pressure, it lifts the relief valve against the pressure on the relief valve and against the weight. When the valve is raised even a little, it exhausts the pressure on the top of the valve, and the air pressure in the cylinder, Z, being heavier than the weight and lever, it carries the valve wide open, and remains so until the pressure is reduced in the air receiver about three pounds, when the ball or weight, being the heavier, brings the valve to its seat again; thus it becomes a perfectly automatic pressure governor, and keeps the air steady within three or four pounds, the piston of the pump working at the same rate of speed all the time. In this way, very many compressors may be worked by power, without using any more power than what is necessary to compress the air required.

This governor is the invention of Mr. James Clayton, whose works are at 45 and 47 York Street, Brooklyn, N. Y., and whose New York office is at 43 Dey Street.

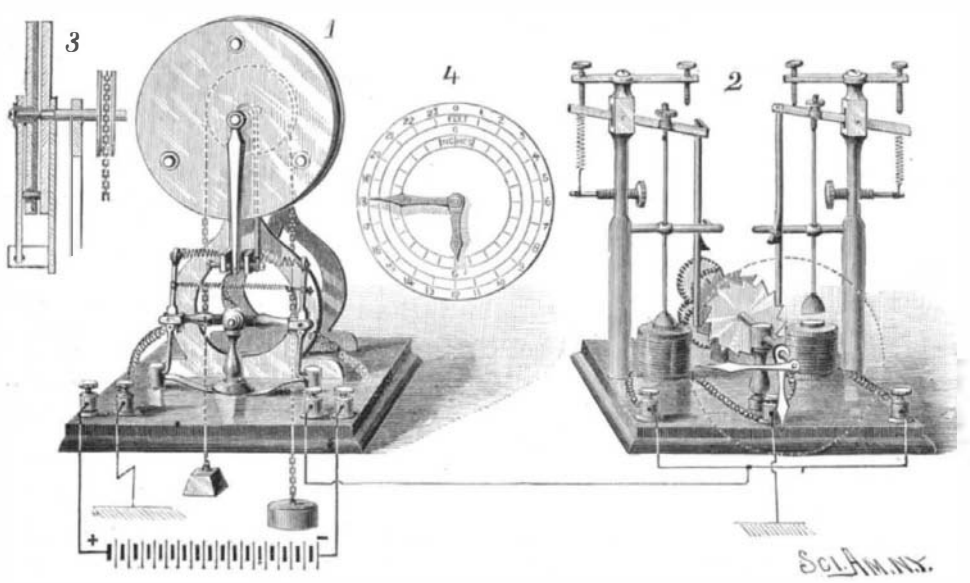


CLAYTON'S PNEUMATIC PRESSURE RELIEF GOVERNOR.

WATER LEVEL INDICATOR.

This instrument is intended for indicating the level of water at a distance. Fig. 1 is a perspective view of the electro-mechanical transmitter, Fig. 2 shows the receiver with the dial removed, Fig. 3 is a vertical section through the transmitter, and Fig. 4 is a detail view of the dial and indexes. On a shaft journaled in standards secured to the base of the transmitter is a wheel over which passes a chain having at one end a float and at the other end a counterbalance weight. When the water in which the float rests rises, the float is raised and the shaft turned by the chain. This movement, through the intermedium of suitably arranged levers and springs, permits the current from the battery to pass to the line in one direction and to the ground in the other. A further turning of the shaft, caused by continued rising of the water, produces a series of electrical impulses upon the line wire, which are all in one direction, and affect only one of the magnets of the receiver. Each electrical impulse corresponds to the rise of the float through the space of one inch, and each impulse draws down the armature belonging to the magnet, thereby indicating by means of an index, Fig. 4, a rise of one inch. The reverse motion of the shaft caused by the water falling so operates the levers as to reverse the current along the line. This reversed current will not affect the first magnet, but will be effective in operating the second magnet, whose armature will then act upon the recording mechanism to diminish the amount indicated by the indexes. In this manner the level of the water is always indicated by the indexes in connection with the dial.

The helices of the magnets being of equal resistance, the current from the line is divided at the receiving instrument into two equal parts; this results in the temporary demagnetization of one of the magnets and the augmentation of the power of the other, so that each magnet is rendered effective by the current suited to it. In addition to its use as a water level indicator, this instrument may be used to indicate the height of a gasometer or the distance traveled by any moving object, either in a horizontal or vertical direction.



WATER LEVEL INDICATOR.

This invention has been patented by Mr. Wilbur S. Mayers, of Fort Apache, Arizona.

The Young Father's First Telegram.

It is great fun to watch the senders of these first baby dispatches as they prepare them. A young father comes in with a hurried step and an exultant, beaming face. He grasps the blank, and dashes off something like this: "Great news! Mary very ill! Fine boy!"

Then he tears that up. Somehow he doesn't want the rude telegrapher to know the name of the helpless but happy sufferer, and he tries it again. "Expected event realized; a little girl; wife doing well." "But, pshaw!" he says, "that's rather a cold way to speak of her to her own father and mother. Wife—why, of course she's wife, but I don't like that," and he tears it up. Then he starts again, and this time he says, "Confound the telegrapher! He shan't know anything about it;" and he writes, "It has come—eight pounds—female; mother all right." He looks at it a minute and tears it up, with the remark, "They don't know whether that means a Jersey calf or a Hambletonian colt." By this time the young man has got into a sweat, and grabbing a pencil he dashes off, "It's a girl. Mother doing nicely," and after looking at that five or six minutes, and it may be with a moistened eye, he signs his first name to it and hands it in. They're proud and happy and conscious, and yet they will do almost anything to conceal their identity.

Sometimes the young man comes in showing signs that the great domestic event has been too much for him, and then I have to take the pencil and help him out, and I do it in a practical way. I get the address and I simply write, "The little stranger is here. It is a girl (or boy). Mother well;" and then the man pays over his half dollar, and nearly pulls me through the window in his fierce desire to go and give the baby a bath.—*Journal of the Telegraph.*

Mounting the Lick Telescope.

The trustees have awarded the contract for mounting the 36-inch objective (now in the hands of the Messrs. Clark, of Cambridgeport) to the firm of Warner & Swasey, Cleveland, Ohio, for the sum of $42,000. Messrs. Warner & Swasey were successful in a competition which included most of the celebrated makers of the world. One firm of celebrated makers (the Repsolds, of Hamburg) declined to compete on account of the short time available for the purpose. The mounting proposed by Messrs. Warner & Swasey will include every one of the improvements which have been lately introduced into the mountings of large telescopes, with the addition of one or two improvements peculiar to themselves.

The telescope is to be 57 feet long; the diameter of the tube is 42 inches. The tube is suspended at the middle, and the point of suspension is to be 37 feet above the floor of the dome. The axes on which the tube moves are supported by a heavy iron column, 17 × 10 feet at its base.

Provisions are made by which it is possible for an observer at the eye end of the telescope to command all the possible motions, and these same motions can also be controlled by an observer stationed on a small balcony 20 feet above the floor. It is expected that, in spite of the great size of the telescope itself and of its great weight, the mechanism will be so delicately adjusted as to render the use of power unnecessary.

Messrs. Warner & Swasey are to have this mounting completed in April, 1887, and some time during the summer of 1887 the glass will be brought to Mt. Hamilton, where the mounting will already have been erected under the great dome, now building at the Union Iron Works, San Francisco, so that one may look forward to the completion of the Lick Observatory some time during the next year. It is impossible without an accurate description to give any complete notion of the excellence of the provisions which have been made by the Lick trustees. A rough idea may be had by considering the cost of the various parts of the great telescope, dome, mounting, etc.: Cost of the dome, $56,850; cost of the mounting, $42,000; cost of the visual objective, $53,000; additional cost of the photographic objective, $13,000; total, $164,850. Besides these sums, several thousand dollars will be required to put the instrument into its final completed state.

The Buffalo Carpet Beetle.

T. W. S. says: Please inform me what way I can best get rid of a great pest, the carpet moth. It is about the size of a grain of wheat, is black, and has hair on it like a caterpillar. It will run backward as well as forward. The carpet moth, of which our correspondent complains, is in all probabilty the so-called "buffalo moth" (*Anthrenus scrophulariæ*), which has previously been figured and described at length in the columns of the SCIENTIFIC AMERICAN. Prof. L. O. Howard, Assistant in Charge of the Division of Entomology, Washington, says: "Where this insect is discovered in a carpeted room, the carpet should be taken up and sprinkled with benzine, and this substance should be poured into the cracks of the floor and under the base-boards. After airing both the room and the carpet, to get rid of the disagreeable odor, strips of roofing paper (prepared with gas tar), about two feet in width, should be spread around the edges of the room, and the carpet should be tacked down over them."

IMPERVIOUS CORKS.—Corks may be made impervious by soaking them—best quality—for several hours in a solution of one-half ounce of glue or gelatine in a mixture of three-fourths ounce of glycerine and one pint of water, heated to a temperature of about 50° C. Such prepared corks may be rendered nearly proof against acids and other chemicals if they are dipped, after thorough drying, for ten or fifteen minutes into a melted mixture of four parts of paraffine and one part of vaseline.

The Inventor of Saccharine.

A representative of the *American Analyst* called upon Dr. Constantine Fahlberg, the inventor or discoverer of saccharine, the new coal tar sugar, and had a long talk with him about his new discovery. The doctor is a tall, well built, handsome German-American of about thirty-eight years of age. He speaks the modern languages fluently, and, despite the celebrity that has so suddenly fallen upon him, is quite diffident and reserved.

"How did I discover saccharine?" he said. "Well, it was partly by accident and partly by study. I had worked a long time upon the compound radicals and substitution products of coal tar, and had made a number of scientific discoveries that are, so far as I know, of no commercial value. One evening I was so interested in my laboratory that I forgot about supper until quite late, and then rushed off for a meal without stopping to wash my hands. I sat down, broke a piece of bread, and put it to my lips. It tasted unspeakably sweet. I did not ask why it was so, probably because I thought it was some cake or sweetmeat. I rinsed my mouth with water, and dried my mustache with my napkin, when, to my surprise, the napkin tasted sweeter than the bread. Then I was puzzled. I again raised my goblet, and, as fortune would have it, applied my mouth where my fingers had touched it before. The water seemed sirup. It flashed upon me that I was the cause of the singular universal sweetness, and I accordingly tasted the end of my thumb, and found that it surpassed any confectionery I had ever eaten. I saw the whole thing at a glance. I had discovered or made some coal tar substance which out-sugared sugar. I dropped my dinner, and ran back to the laboratory. There, in my excitement, I tasted the contents of every beaker and evaporating dish on the table. Luckily for me, none contained any corrosive or poisonous liquid.

"One of them contained an impure solution of saccharine. On this I worked then for weeks and months until I had determined its chemical composition, its characteristics and reactions, and the best modes of making it scientifically and commercially.

"When I first published my researches, some people laughed as if it were a scientific joke, others, of a more skeptical turn, doubted the discovery and the discoverer, and still others proclaimed the work as being of no practical value.

"When the public first saw saccharine, however, everything changed. The entire press, European and American, described me and my sugar in a way that may have been edifying, but was simply amusing to me. And then came letters. My mail has run as high as sixty a day. People wanting samples of saccharine, my autograph, or my opinion on chemical problems, desiring to become my partner, to buy my discovery, to be my agent, to enter my laboratory, and the like.

"What have I done? I have started a company in Germany to manufacture saccharine, with a capital of 2,000,000 marks. They are already at work, and are now producing the new sugar. It costs, or rather we sell it, between $10 and $12 per pound, but will reduce these figures considerably before a year has gone past. I would rather have started in this country, which is my home, but the high price of skilled labor, and the high tariff on the crude materials (fine chemicals) of which saccharine is made, deterred me and my friends from so doing. I will say, however, that if applied chemistry continues progressing as it has done in the past decade, we shall open branch works here within the next five years."

Saccharine is proving a wonderful success. It is used already in many ways. Prof. Leyden, of Berlin, recommended it to sweeten fine wafers and other foods for invalids, and wrote a formula for it in such cases. This is used by bakers and confectioners, and more especially by Mannl & Co., the great wafer manufacturers of Carlsbad, Bohemia. It is also employed by the makers of glucose and beet sugar. These are inferior in sweetness to cane sugar, but superior in digestibility and healthfulness. The addition of a trifling fraction of saccharine makes them the equals of the finest cane sugar in the market. Saccharine is so sweet that a teaspoonful converts a barrel of water into sirup. A small wafer of it converts the bitterest quinine solution or acid drink into a regular molasses. It will therefore be invaluable in disguising and destroying all the bitter and sour tastes in medicine without changing the character or action of the drugs.

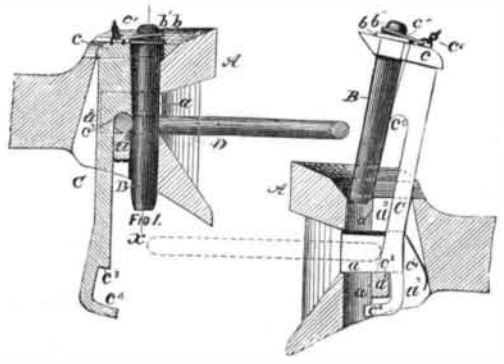
Saccharine does not decay, mould, or ferment, neither is it attacked by bacteria. It has no injurious effect upon the human system. What effect has been noticed is rather beneficial than otherwise. This immunity from decay will render it of great utility in pickling and preserving delicate vegetables and meats. Where sugar is used as a flavor and not as a food, there, I think, it is bound to be replaced by saccharine; where as a food and flavor combined, it will not be. In the future the new sugar will be used by druggists, physicians, bakers, confectioners, candy makers, preserve and pickle makers, liquor distillers, wine makers, and dealers in bottlers' supplies.

THE FORMATION OF SACCHARINE.

The new coal tar product, saccharine, which is expected to prove very useful on account of its sweetening power—in respect of which it stands to cane sugar in the ratio of 220 to 1, and with which considerable antiseptic properties are combined—was mentioned at length by Sir Sydney Roscoe in a recent discourse at the Royal Institution. This new substance was described by the lecturer as perhaps the most remarkable of all the marvelous products of the coal tar industry. It is not a sugar, but contains carbon, hydrogen, sulphur, oxygen, and nitrogen; and its chemical name is benzoyl sulphuric imide. It is neither a nutrient nor a poison. It is derived from the toluene of coal tar, by a process comprising at least seven distinct steps; the whole contributing a triumph of synthetical chemistry. Toluene is first heated with sulphuric acid of 168½° Twaddell, but not above 100° C. After all the original toluene has disappeared, the mixture is run into wooden tanks partly filled with cold water, where it is stirred up with chalk. The mass thus neutralized is filtered through a press; and the calcium salts are treated with sodium carbonate, with another filtration following. The solution of the sodium salts thus obtained is evaporated, and the solid residue dried by steam heat. This material is then mixed with phosphorus trichloride, and treated with a current of chlorine. Certain residuals are then driven off, and the apparatus contains two sulphonic chlorides—one solid and the other liquid. Only the latter is capable of yielding saccharine. This is now separated, mixed with solid ammonium carbonate, and steamed. After some further mechanical treatment, the liquid is oxidized by potassium permanganate; and, finally, the pure saccharine is precipitated by dilute mineral acids. It has a far sweeter taste than sugar, and a faint, delicate flavor of bitter almonds.

Report of the New York Railroad Commission on the Car Coupler Tests.

On the 7th of July the Railroad Commission announced its decision in regard to the car-coupling tests made at East Albany last month. They award the first place to the Hoag coupler. This is an invention not in use on any railroad at present. It is the work



of C. M. Hoag, of Greenbush, an engineer on the Boston and Albany Railroad. At the trial it was the only one that made the "flying switch" automatically. In its normal condition the link is level, and works successfully on all cars. The recommendations of the commission, which are the most important made since its organization, are as follows:

First.—That the standard height of drawbar of the Master Car Builders' Association, viz., 2 feet 9 inches from top of rail to center of drawhead, when the car is empty, be adopted by all railroad corporations; that new cars be made to conform thereto, and that old cars, when repaired, be made to conform as nearly as possible.

Second.—That all freight cars not having platforms be equipped with "deadwood" blocks to conform to the standard of the Master Car Builders' Association.

Third.—That a standard link be adopted of 10½ inches inside measurement and 13 inches outside measurement.

Fourth.—That all existing link and pin drawheads be provided with a stop in the throat to prevent a link entering more than 7 inches

Fifth.—Of the couplers presented to be tested on the 16th and 17th of June, the board finds the following to fulfill the requirements of the law. There are many others of which the board has drawings or models, and which possess merit, but as to them the board makes no mention for the reasons, first, that cars were not equipped with them; and, second, that little weight can be given to the workings of a model alone. Those practically tested are divided, first, into classes mentioned in what the board regards as the order of merit; second, each coupler is mentioned under its class, in what the board regards as its order of merit.

First Class, A—Link and pin couplers, pin held up by catch or "dog." The "dog" is thrown back by a link entering and allowing the pin to drop automatically; uses standard link, and couples automatically with the old drawbar of stop in throat, or B, beveled pin permitting link to slip under. Hoag, McKeen, N. Barr, Perry, United States, Robinson, Keeler, Sherman, Thurber, Whitman, Kilmer beveled pin, Wilson beveled pin.

Second Class—Vertical hook and link, link pushed on to hook, couples automatically with old drawbar of stop in throat. Archer, Aikman, Marks, Smith, Baldwin, Fennell.

Third Class—Janney, Barnes, Cowell, Thurmond, Dowling, Heim, Titus & Bossinger, Boston automatic, Lorraine.

Fourth Class—Ames, Custis & Wood, Adams, Felthausen, and Lawtenslager.

We give herewith a sketch of the Hoag Coupler which was patented July 15, 1884.

The following are the patentee's claims:

1. In a car coupling, the combination, with a drawbar head, A, provided with recessed opening, a, a vertical opening, a', having the vertical mortise, a^2, opening thereinto, and the bridge bar, a^3, all as herein described, of the carrier, C, adapted to contain a removable coupling pin, B, and provided with shoulders, c' and c^3, and hook, c^4, all being constructed and arranged to operate as and for the purpose herein specified.

2. In a car coupling, the combination, with a separate coupling pin, B, of the carrier, C, having the yoke, c^1, jointed thereto, the said yoke being adapted to engage with the coupling pin, B, in the manner and for the purpose herein specified.

Electrical Subways for New York.

The special commission of which Mr. Roswell P. Flower is president, authorized by the State Legislature for the purpose of carrying out the provisions of the statute requiring all telegraph, telephone, electric light, and other special wires to be laid underground, reported on the 30th ult. their proposed plan, which, when approved by the Attorney-General, will be adopted. The report favors what is termed the "drawing-in" system, in other words, the laying of a large pipe underground, provided at frequent intervals with convenient manholes. The wires are drawn in through these, and spliced as required.

Iron pipe was found to be objectionable, since it would rust and corrode, and at the same time furnish a ground in case a wire was accidentally broken.

A pipe composed of asphalt and gravel is recommended, first because it is much cheaper than iron, is easily moulded to suit different curves, and second because it is of itself a non-conductor of electricity, steam, or gas, is non-corrosive, and can be made waterproof.

The following are the conditions adopted by the Commission respecting the manufacture of the pipe:

Its material shall be an asphalt or bituminous concrete which shall be capable of sustaining the following tests: It should sustain a crushing test of 4,000 pounds per square inch, and have a tensile strength of not less than 300 pounds per square inch of section; it should not crack when subjected to a temperature of 10°, or lose its shape at 200°; it should not soften below 160°; it should resist the action of organic acids and illuminating gas, and should not disintegrate under the action of salt water; the pitch or asphalt used should be inspected before it enters into the concrete, and be pliable at 150°, but brittle below that temperature. It should not be heated above 325° in boiling; the sand used should be silicious, and the porosity of each lot carefully determined, so as to insure the perfect cohesion of the mass, with no excess of plastic material. But this shall not prevent the use of any other material where the special exingencies of particular electrical services or of particular localities render it advisable in the opinion of the Commission. Its form shall in general be that of a conduit, with convenient manholes, where cables and insulated wires may be readily drawn in and out of distinct ducts in the conduit; but this shall not prevent the laying of wires in other ways, where for special reasons it may seem desirable to the Commission.

Mr. Henry S. Kearney was appointed associate supervising engineer.

It is expected districts will soon be mapped out, and a system perfected for carrying out the work. It is proposed to let the work out to a special construction company, as the Commission has no funds for constructing and laying the pipes.

Annual Convention of Photographers.

One thousand photographers, from all parts of the United States and Canada, were present at the seventh annual convention of their association, recently held at St. Louis. Many foreign artists who were not able to attend personally sent specimens of their work as representatives. An interesting feature of the convention was the exhibition by the various photographers of many views taken in the United States, Canada, England, and Germany. These included an almost infinite variety of subjects. They covered all the available space on the walls of the hall used for the daily sessions, as well as fourteen small adjacent rooms and five thousand square feet of partitions, which were specially erected for the purpose. There was also on display a most complete exhibition of all apparatus known to the art.