G. P. GANSTER.

Automatic Gas Lighting and Extinguishing Mechanism.

No. 211,505. Patented Jan. 21, 1879.

FIG. 2.

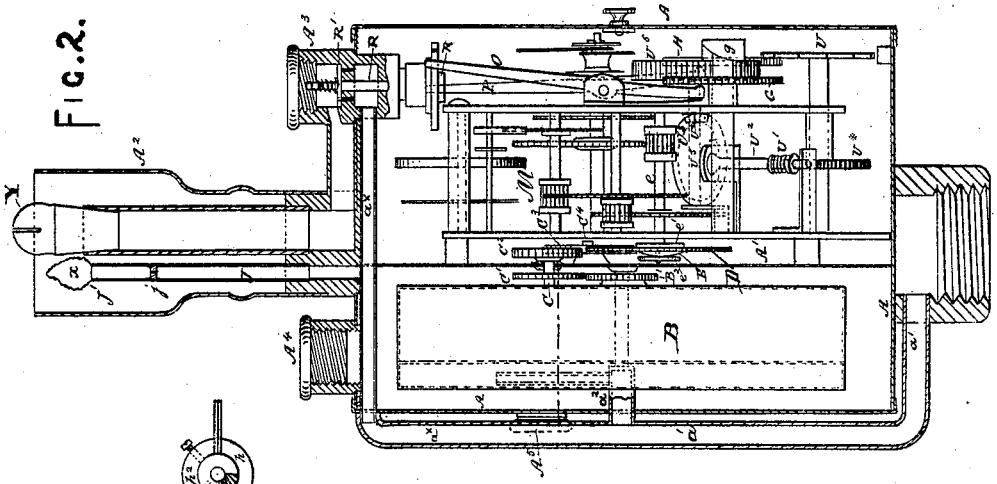


FIG 3

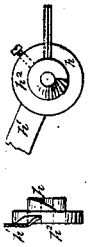
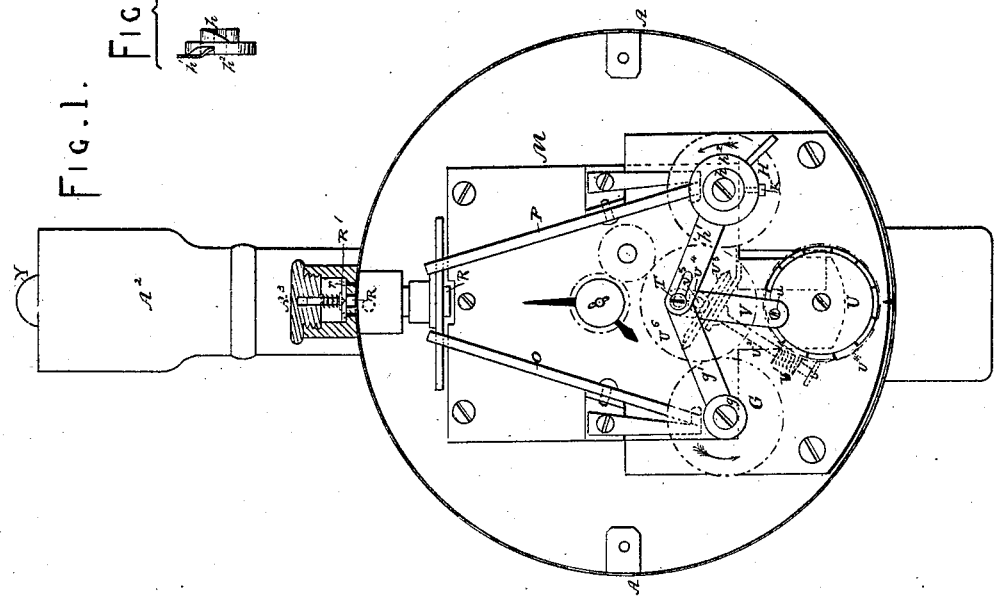


FIG. 1.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE P. GANSTER, OF READING, PENNSYLVANIA.

IMPROVEMENT IN AUTOMATIC GAS LIGHTING AND EXTINGUISHING MECHANISMS.

Specification forming part of Letters Patent No. **211,505**, dated January 21, 1879; application filed June 7, 1878.

To all whom it may concern:

Be it known that I, GEORGE P. GANSTER, of Reading, Berks county, in the State of Pennsylvania, have invented certain new and useful Improvements relating to Lighting and Extinguishing Gas, of which the following is a specification:

My improved apparatus is analogous in its general features to that described in the patent granted to me December 4, 1877, No. 197,771. In that patent I have shown a clock mechanism, driven by the gas itself, acting on a motor-wheel, and imparting the requisite force or power to drive the clock through the medium of a spring. The spring was wound up by the force of the mechanism while much gas was being used during the night, and retained sufficient power to drive the clock during the interval when little was used during the day.

I find the consumption of gas, although slight, is sufficient to drive the small and easily-worked clock mechanism which is required, and I can greatly simplify the mechanism and increase the certainty of its efficient action by making the connection direct from the gas-motor to the clock, providing a suitable slip-joint to dispose of any surplus motion.

In my previous apparatus there were two adjustable cams, each independently changeable, the one determining the period for letting on the gas in a strong flame for illuminating when night comes on, and the other for determining the period in the morning for suppressing the strong flame and reducing the consumption of gas to the very small flame which burns during the day. As the days lengthen or shorten, an attendant may change both cams, so as to keep tolerably close to the proper times; but it requires much attention.

I have now devised and practically worked out means for automatically changing such periods of letting on and suppressing the flow of gas as the days lengthen and shorten with the change of seasons.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a front view of the apparatus, partly in section, with the front of the case removed. Fig. 2 is a central vertical section of the same, with the front of the case in position; and Fig. 3 shows detailed views of one of the cams.

Similar letters of reference indicate like parts in all the figures.

A is the fixed frame-work or casing; a^1, the pipe through which gas is received; and a^*, a by-pass, through which the gas to supply the main burner is carried around without passing through the motor, as will appear farther on.

B is a motor-wheel, receiving the gas through a central pipe, a^2, which is a branch from the pipe a^1. Its construction need not be described further than to say that it corresponds with the well-known form of revolving wheel used in wet-meters. This wheel is divided by a tight partition, A^1, from the other portion of the casing, and the chamber in which the motor-wheel B is inclosed is filled to the proper level with glycerine, oil, or analogous fluid.

The wheel B is delicately mounted, so that it may revolve with little resistance from friction. It carries a spur-gear wheel, B′, which engages with another wheel, C^1, on the shaft C. This shaft turns in a close-fitting bearing in the partition A^1, and thus communicates the turning motion of the wheel B to the clock mechanism.

I will represent the entire clock mechanism by the single letter M. It will be understood that any of the approved forms of clock-work may be used for this mechanism, with the additions of the parts now to be described, which adapt it to its peculiar service in this combination.

There is a slip-joint at the point E. A spur-wheel, C^2, fixed on the shaft C, gears with a wheel, C^3, revolving on a stud, C^4, carried by the partition A^1. The wheel C^3 engages with a larger wheel, D, which is fitted loosely on the shaft *e* of the clock-work. The turning of the wheel D is of no effect in driving the clock mechanism except as friction is induced thereon by griping this wheel between collars on the shaft *e*. One of these collars, e^1, is fixed and plane. The other collar, E, is dished, and may, if desired, be cut with several slits extending inward from the periphery nearly to the center, to increase its elasticity. This collar E being formed with a square hole and match-

ing on a square part of the shaft *e*, contributes to receive and impart to the shaft *e* the rotatory force of the wheel D, according as it is pressed with more or less force against the latter. A nut, e^2, fitted on the threaded end of the shaft *e*, may be turned by hand or otherwise to adjust the force with which the collars E e^1 gripe or pinch on the wheel D to form the slip-joint.

When, in consequence of the passage of the larger quantity of gas, the motor-wheel B turns faster than is required to drive the clock-work, the slip-joint, which I will designate, when necessary, by the single letter E, allows the surplus motion to be lost in simply overcoming the friction between the wheel D and the shaft *e*. A constant small consumption of gas being maintained, the wheel B tends to turn with an approximate uniformity; and the parts being rightly adjusted, the motor supplies the proper force for the clock-work, with always a little surplus motion.

The clock-work M is so geared as to revolve the wheels G and H once in twenty-four hours. They revolve in the direction indicated by the arrows. I will designate them, when necessary, as "twenty-four-hour" wheels. There are adjustable cams *g* and *h* mounted on the same centers as the wheels G and H, and by a construction substantially as represented in my Patent No. 197,771, above referred to, each rotation of the wheel G communicates an opening motion at a certain period to a valve for admitting gas to the main burner, while at another period the wheel H, acting in concert with its cam *h*, gives a closing motion to such valve.

O and P are levers which communicate motion, respectively, from G and H to horizontal arms extending in opposite directions from an upright shaft, R, on the upper end of which upright shaft is an oscillating valve, in the form of a horizontal circular plate, R′, provided with small holes *r*. This plate R′ *r* fits gas-tight upon a plane stationary surface, which is correspondingly perforated, and is open to receive gas through the pipe a^1. When the lever O turns the shaft R in one direction the gas is let on, and, flowing out through the large burner Y, gives the desired illumination, until by the action of the other lever, P, the shaft R is turned again in the opposite direction, and correspondingly turns the valve R′, so as to move its holes *r* out of connection with the corresponding holes in the seat, and the gas being shut off the main burner Y is extinguished.

The gas issuing from the main burner Y is ignited by a small constant flame, *x*, issuing from a relatively-large orifice or mouth-piece, J′, which is fitted on the small pipe J, through which the gas issues after its escape from the motor-wheel B. This constant flame must be very small in order to avoid wasting gas. I find by experiment, or otherwise, the required size of the orifice to discharge a proper amount of gas and contract the passage to the required extent at the point *j*. I attach much importance to the fact that this point is not at the mouth or issuing-point at the top J′ of the tube but is at a point so far removed therefrom that the heat of the flame *x* induces no corrosion or other difficulty. In my experiments I have produced the proper contraction at the point *j* by introducing an accurately-drilled jewel at the required point, and closing the metal of the tube J tightly upon it by compression.

The shield A^2, which incases the small flame *x*, and prevents it from being extinguished by drafts of air or other accidental cause, may be of the same construction that I have shown in my previous patent. The casing A^3, which covers the valve R′, should be adapted, as shown, to allow the valve to be inspected and removed, when necessary. The filling-orifice A^4 connects with the chamber in which the motor-wheel B turns, and is available to supply additional oil or glycerine, as required.

A^5 is an overflow-plug, which aids to regulate the height of the fluid.

I can vary the position of the cam *h* at will to reduce the action proper to this cam at an earlier or later period by simply slacking the corresponding pinching-screw K and shifting the cam partially around and again tightening it by setting up the screw. When this cam is once properly adjusted to correspond in action with the other cam, *g*, it need not be again disturbed; but the adjustment for the varying lengths of the days may be effected through the medium of the connected levers g' h^1. These are connected, the lever g' directly to the cam *g*, and the lever h^1 indirectly to the cam *h*, by the aid of the pinching-screw K, which is tapped through the ring encompassing the cam, as shown. The levers g' h^1 extend toward each other. They are coupled by means of a screw, T, which is tapped into the arm g', passing loosely through a slot in the arm h^1. By raising or lowering the screw T both arms are moved simultaneously and to a practically equal extent.

The cams *g* and *h* are so formed that the lowering of the screw T, while it makes the period of lighting earlier, makes the period of extinguishing later. So, also, raising the screw T and correspondingly raising the arms g' h^1 makes the period of lighting later and the period of extinguishing earlier.

The above reduces to a single operation the adjustment of both cams, and is to that extent an improvement on my previous invention; but my improvement makes an important step further.

U is what I term a "year-wheel." It is turned by a gear, U*, fixed on its shaft, which engages with a worm-gear, U^1, carried by a shaft, U^2, upon which is mounted a bevel-pinion, U^3, gearing into a pinion, U^4, fixed on the shaft U^5 of the gear-wheel U^6, which receives motion from the clock mechanism, and drives the twenty-four-hour wheels G H, thus causing the wheel U to make one complete revolution only once in three hundred and sixty-five

and one-quarter (365¼) days. A crank-pin, *u*, set near the periphery of this year-wheel U, is connected by a link, V, to the screw T. As the wheel U slowly revolves, it acts through the link V to lower the screw T during the entire period from June to December, and to raise the screw T during the period from December to June. The crank-motion is excellently well adapted to induce this automatic action. For a considerable period, near the 20th of December, the crank is on its dead-center at the bottom, and induces no appreciable change in the position of the cams. A like condition obtains near the summer solstice; but at the periods when the sun is crossing the line in March and September the change is rapid. This automatic adjustment relieves the attendant from all labor, and, furthermore, makes the action more perfect than can be attained by any ordinary means in adjusting by hand. The change is each day, and the mechanism can be constructed and adjusted with nicety, so as to keep very near the desired moment of lighting and extinguishing.

Modifications may be made by any good mechanic. I can vary the construction of the slip-joint E within wide limits. I can make the nozzle or tip J′ adjacent to the small flame removable and exchangeable, if it shall under any circumstances be desired. I can provide a cock which shall close the flow of gas to support the small flame whenever it is required for repairs or for other purposes.

I can employ other forms of motors than the wheel B represented; but it is obviously important that it shall be a construction of motor which allows little or no leakage, because the consumption of gas is very small, and if much leakage or passing by occurs the flame would be supplied without the motor being worked and the clock would stop.

I can use much less than the entire mechanism of the clock to serve as the time-controlling mechanism. Thus a simple escapement and a much smaller set of gear-wheels than is ordinarily employed may serve; but I esteem it important to attain a high degree of perfection in the time-keeping, so that if practicable the mechanism may run for months or years without the clock mechanism gaining or losing so much as to require resetting. The uniformity of temperature maintained by the close proximity of the small continuous flame facilitates the attainment of this degree of perfection. By using glycerine or oil as the sealing-fluid for the motor with the connections shown, I insure a lubricating of the mechanism which largely or entirely precludes the necessity of ever oiling by hand; but this may be varied, and the work may be oiled by hand at long intervals, or may, I believe, run without oil.

Some parts of the invention may be useful without the others. I can make the whole of the gas flow through the same motor-wheel B, with the effect of increasing the amount of slipping motion at the slip-joint.

I claim as my invention—

1. The combination of a motor operated by a small continuous flow of gas, a small burner supplied thereby, a larger burner, and provisions for turning on and off the flow to the latter by the action of the motor, as herein specified.

2. A clock mechanism operated directly from a gas-motor without intermediate spring, in combination with a small burner, maintaining a continuous motion of the motor, and mechanism controlled by the clock for letting on and shutting off the supply to a main burner, as herein specified.

3. In an apparatus for mechanically lighting and extinguishing gas-lights, the independent pipes or conduits $a^{\times}$ a^{2}, one for the small continuous flame, and the other for the strong periodic flame, in combination with the subordinate burner J′, serving the double function of igniting the large burner and of maintaining a continuous motion of the motor B, as herein specified.

4. In an apparatus for mechanically lighting and extinguishing gas-lights, the cams *g h* and arms g' h^{1}, connected as shown, so that the adjustment of one cam insures the corresponding adjustment of the other, as and for the purposes herein specified.

5. In an apparatus for mechanically lighting and extinguishing gas-lights, the employment, in combination with the operating-cam *h* and adjusting-lever h^{1}, of the ring h^{2}, loosely inclosing the cam *h*, and allowing the latter to be adjusted within the former, and secured by the pinching-screw K, or its equivalent, as and for the purposes herein specified.

6. In an apparatus for mechanically lighting and extinguishing gas-lights, the year-wheel U and connection V, in combination with the arms g' h^{1}, cams *g h*, and suitable clock mechanism M, adapted to automatically induce the required changes in the periods of commencing and discontinuing the illumination, substantially as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 5th day of June, 1878, in the presence of two subscribing witnesses.

GEO. P. GANSTER.

Witnesses:

EDITH BROOKES,

CHAS. C. STETSON.