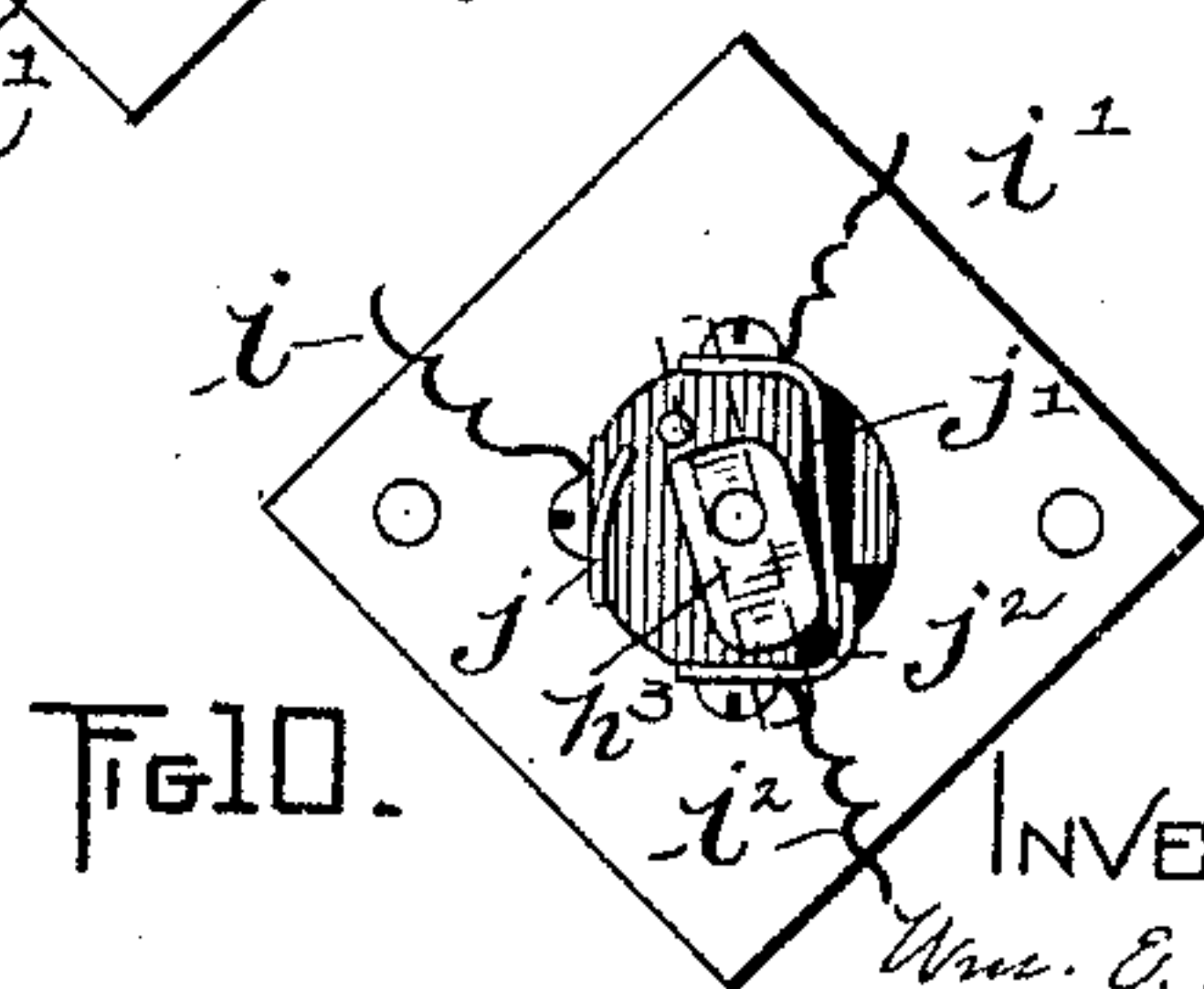
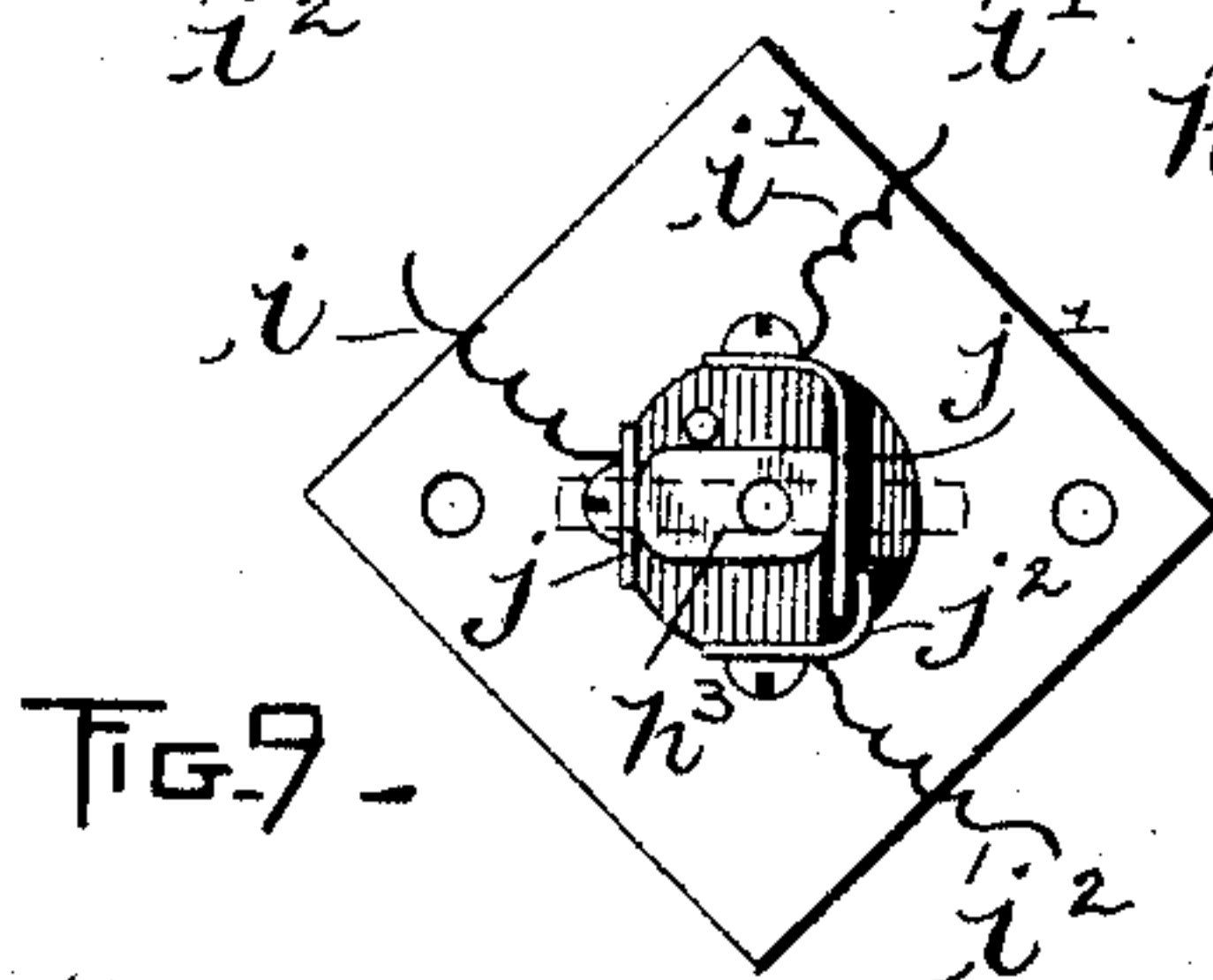
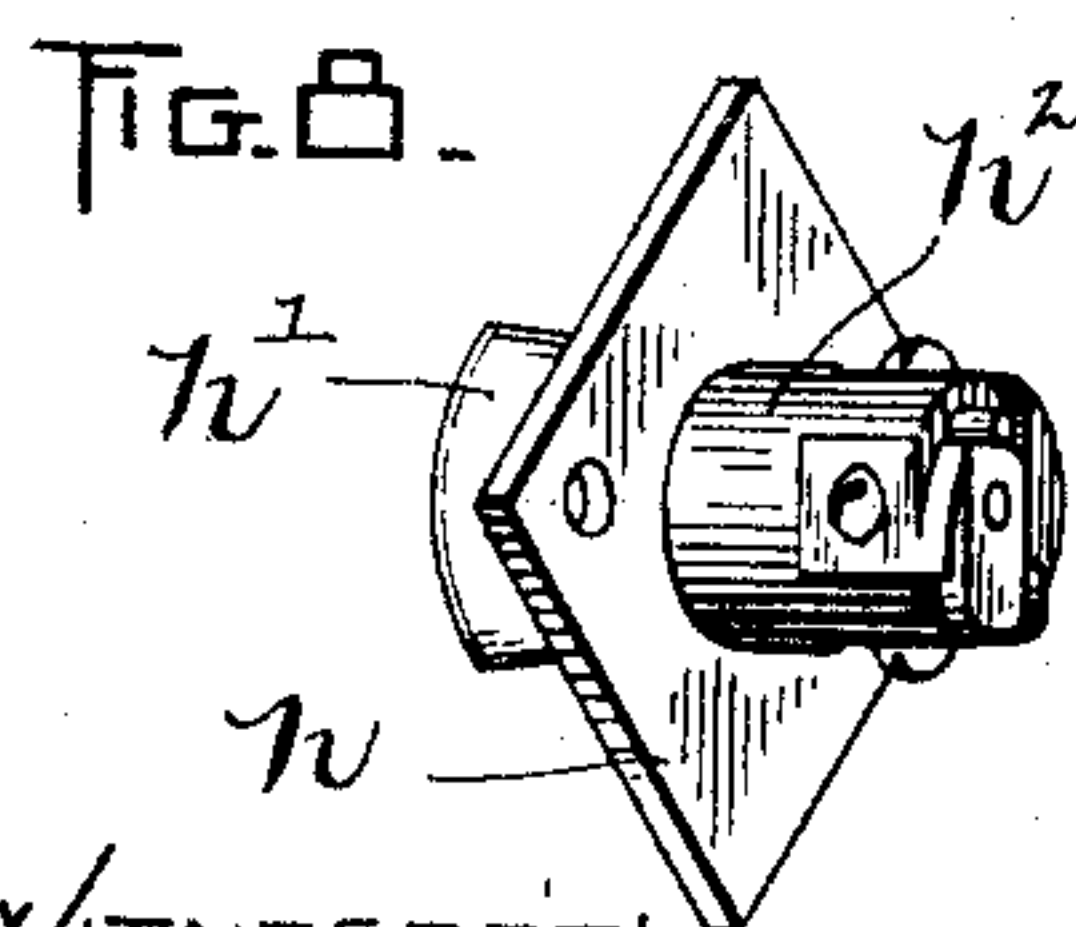
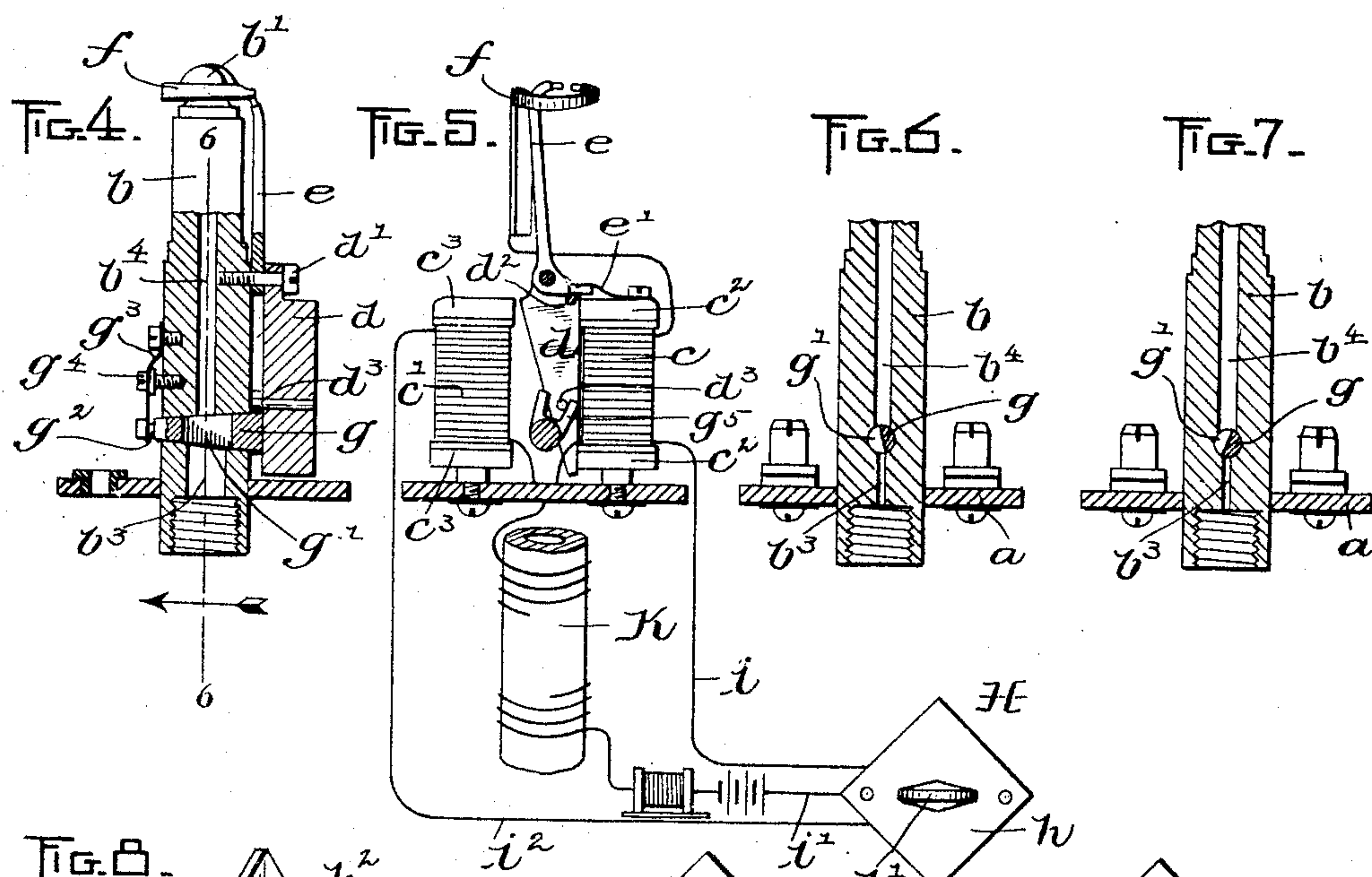
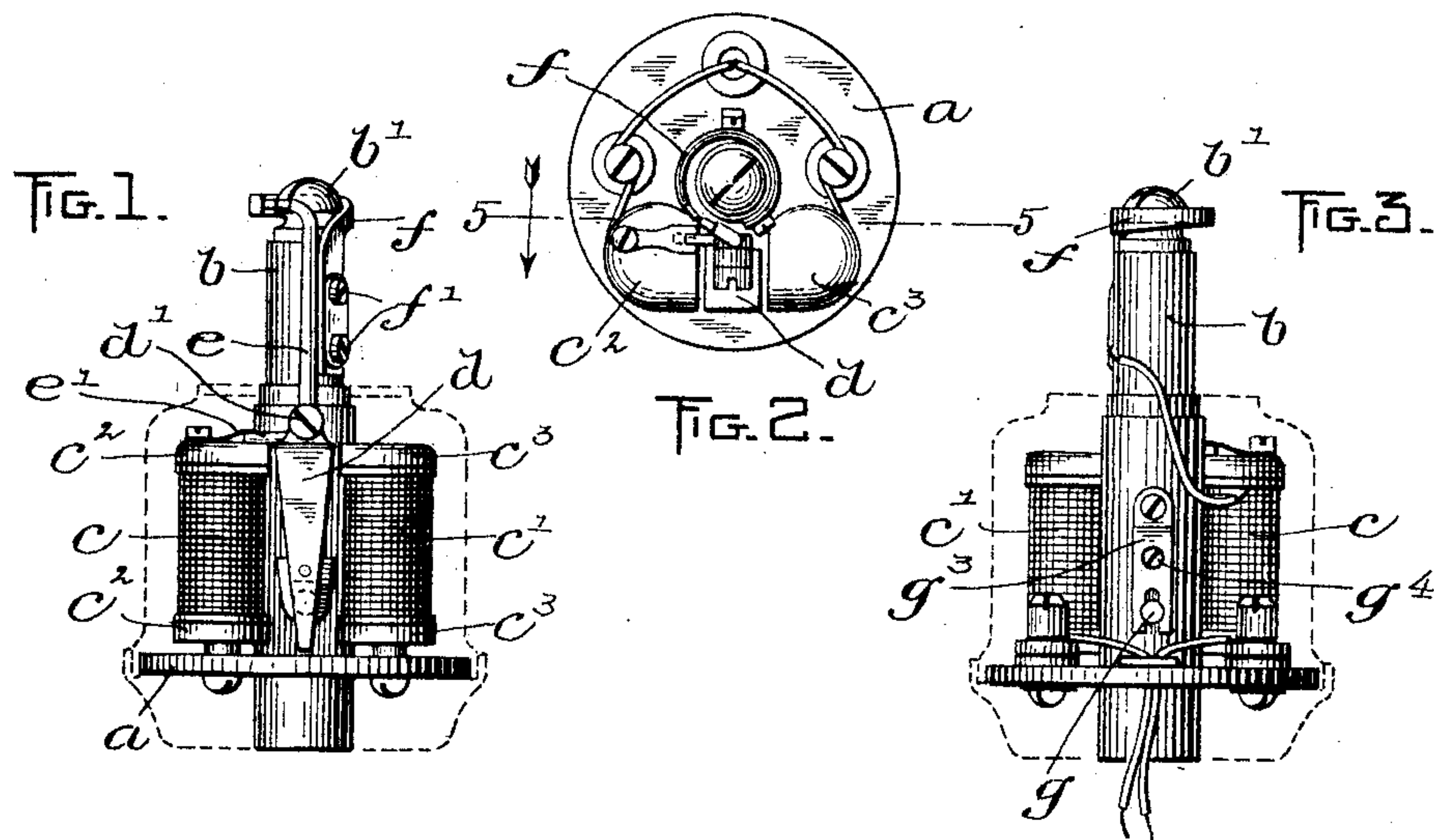


W. E. CRAM.
ELECTRIC GAS LIGHTING APPARATUS.

(Application filed Jan. 7, 1898.)

(No Model.)



WITNESSES:
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UNITED STATES PATENT OFFICE.

WILLIAM E. CRAM, OF BOSTON, MASSACHUSETTS.

ELECTRIC GAS-LIGHTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 631,888, dated August 29, 1899.

Application filed January 7, 1898. Serial No. 665,874. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. CRAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Electric Gas-Lighting Apparatus, of which the following is a specification.

This invention relates to an improved electric gas-lighting apparatus; and it consists in the novel features of construction and relative arrangement of parts hereinafter fully described in the specification, clearly illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying sheet of drawings, forming a part of this application, in which like characters designate like parts wherever they occur.

Of the drawings, Figure 1 represents a front elevation of a gas-burner constructed in accordance with my invention, the inclosing casing being shown in dotted lines. Fig. 2 represents a top plan view. Fig. 3 represents a rear elevation. Fig. 4 represents a section on line 4 4 of Fig. 2. Fig. 5 represents a diagrammatic view showing the electric connections, being also a section on line 5 5 of Fig. 2. Figs. 6 and 7 represent vertical sections on the line 6 6 of Fig. 4, showing different positions of the valve. Fig. 8 represents a rear perspective view of the operating-switch. Figs. 9 and 10 represent rear elevations of the same, showing the different positions.

Referring to the drawings, *a* designates a metal base attached to the lower part of the burner *b* and forming the support for two electromagnets *c c'*, having four pole-pieces *c² c²* and *c³ c³*, between which is hung a wedge-shaped armature *d*, the said armature being pivotally mounted on a stud or pin *d'*, which screws into the burner *b*. On the said stud is also pivoted a vibratile arm *e*, which is adapted to coöperate with a metallic member *f* in producing a series of igniting-sparks in the vicinity of the orifice of the burner-tip *b'* when a current is passed through the magnet *c*, as hereinafter explained. *e'* is a spring which normally actuates the upper end of the arm *e* toward the tip of the member *f*. The member *f* constitutes a thermostat, which expands or uncurls under the influence of the gas-flame and is preferably composed of two

strips of metal, such as brass and iron, having different coefficients of expansion, the one having the larger coefficient being placed on the inside. The thermostat *f* is attached to the burner *b* by means of screws *f'* and is insulated therefrom by means of a strip of mica or other suitable material. *d²* is a pin on the upper portion of the wedge-shaped armature *d*, which engages the heel of the arm *e*, as indicated in Fig. 5, when the magnet *c* is energized. It will thus be seen that while the wedge-shaped armature *d* and the arm *e* are both pivoted on the stud *d'* and the former actuates the latter in one direction by means of the pin *d²* there is no positive connection between the two, and the armature is free to be attracted by the magnet *c'* without affecting the arm *e* when the gas is to be shut off, as will presently be described.

The thermostat *f* and arm *e* are provided with platinum tips, which separate and come together again under the influence of the magnet *c*, the circuit of which includes a spark-coil and battery.

g is a tapered plug or valve accurately ground to fit a tapered socket in the burner and adapted to turn in said socket to control the flow of gas through the burner.

A narrow port *b³* is formed in the burner below the plug *g*, and a wider port *b⁴* is formed above said plug. The plug is partially cut away at *g'* to form a by-pass for the gas. When said plug occupies the position indicated in Fig. 6, both of the ports *b³* and *b⁴* are uncovered, so that a free passage is allowed for the gas to the orifice of the burner. When said plug occupies the position shown in Fig. 7, the solid portion of the plug covers the port *b³* and prevents the flow of gas.

The rear end of the plug *g* extends through the burner and is provided with a groove *g²*, which is engaged by a forked spring *g³*, whose tension may be adjusted by a screw *g⁴*, so as to vary the tightness of fit of the plug in its socket. The front end of the plug is provided with a U-shaped lever *g⁵*, between the arms of which operates a pin *d³* on the armature *d*. When the magnet *c* is energized, the pin *d³* engages said lever and throws the plug or valve *g* to its open position, Fig. 6, and when the magnet *c'* is energized the armature is swung in the opposite direction and the

pin d^3 engages said lever and throws it to its closed position, Fig. 7. When neither of the magnets is energized, the armature d hangs in an intermediate or vertical position between the poles of the two magnets, as shown in Fig. 1, the arms of the lever g^5 being sufficiently far apart to permit said armature to hang in this position when the valve is either open or closed. By this construction the armature is permitted to vibrate between the positions shown in Figs. 1 and 5 without disturbing the open condition of the plug-valve, and said armature when neither magnet is energized will hang in its intermediate position ready to be attracted toward either magnet without having to be first drawn away from the other magnet, and the movement of the armature to its intermediate position is never interfered with by any portion of the gas-controlling valve. The arm e and thermostat f being in circuit with the magnet c , as shown in Fig. 5, and being normally in contact when said thermostat is cold, it will readily be observed that if the circuit is completed through the magnet the armature d will first be attracted toward the poles c^2 and will then be released because of the breaking of the circuit, when the pin d^3 engages the heel of the arm e and causes the upper end of the same to separate from the thermostat f . At the same moment the gas is turned on and the succession of sparks between the contact members will ignite the stream of gas issuing from the top of the burner. The gas-flame very quickly heats the thermostat f and causes the same to uncurl and break contact with the arm e , thus causing a cessation of the sparks. The contact remains broken as long as the gas remains lighted, but if for any reason the flame should be extinguished the thermostat will very quickly cool off and return to its original position of contact, thus completing the circuit again and reigniting the gas. The gas may be turned off by completing a circuit through the magnet c' and causing the armature d to be attracted toward the pole-pieces c^3 of said magnet. The gas-pipe k , as is usual in devices of this character, forms a common return for the circuit through the lighting and extinguishing magnets.

It is a switch for operating the lighting device, the said switch being placed in any convenient location, such as the wall of a room or of a corridor. The switch H consists of a base-plate h , a button or handle h' , and a suitable system of contacts operated by turning the said button and mounted on a block h^2 , of insulating material, attached to the back of the plate h . These contacts are three in number and are connected by electrodes i , i' , and i^2 with the magnet c , the gas-pipe, and the magnet c^3 , respectively, the electrode i being connected with a contact-strip j , the electrode i' with a strip j' , and the electrode i^2 with a strip j^2 . h^3 is a short metallic arm or cam member attached to the spindle of the

button h' and adapted to turn therewith. When it is desired to light the gas, the button h' is turned so as to bring the arm h^3 into contact with the strips j and j' , as shown in Fig. 9, thus completing a circuit through the magnet c . When thus turned, the button remains in this position and the contact is maintained at the switch, but is broken, as above described, at the burner as soon as the gas is lighted. When it is desired to extinguish the gas, the button h' is turned in the reverse direction until the arm h^3 reaches the position shown in Fig. 10, in which it produces contact between the strips j' and j^2 , thereby completing the circuit through the magnet c' . As soon as the button h' is released it assumes an intermediate position, (shown in Fig. 8,) the elasticity of the strip j' causing it to break contact with the strip j^2 .

From the above description it will be seen that I have provided a remarkably simple gas-lighting device, which overcomes the danger arising from the accidental extinguishing of the gas. It will further be observed that I provide improvements in the mechanical construction of gas-lighting devices of this character by dispensing with two of the four magnets ordinarily employed, and thereby reducing the expense of construction and the current required to operate the device. It will further be noted that the lighting of the gas is more easily accomplished than heretofore, since with lighting devices as usually constructed it is often necessary to make several attempts to light the gas, because of the presence of air in the pipes when the lighting-button is first manipulated, or else provide for a continuous current while the gas is burning, whereas in the arrangement which I provide it is merely necessary to turn on the switch and let the device take care of itself, no electric current being employed except at such times when the gas is first to be ignited or is to be automatically reignited after accidental extinguishment.

I do not wish to confine myself to the exact details of construction herein set forth, since the same may be variously modified without departing from the spirit of my invention.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the character specified, a gas-burner, having a valve, a vibratile igniting device, a magnet included in an igniting-circuit, a single armature for controlling the valve and having connections for actuating the igniting device in one direction a switch having a position in which it makes and maintains contact between the electrodes of the igniting-circuit, and a thermostatic device adapted to break the igniting-circuit at

the burner, under the influence of the gas-flame, while contact is still maintained at the switch.

2. In an apparatus of the character specified, a gas-burner, a valve therefor, electromagnetic devices for opening and closing said valve, a thermostat arranged in the valve-opening circuit in proximity to the orifice of the burner, and a magnetically-operated vibrator in said circuit, the electromagnetic devices including a single armature for controlling the valve and having connections for actuating the vibrator in one direction, said vibrator being adapted to cooperate with the thermostat in producing a series of gas-igniting sparks when the valve-opening circuit is completed, the thermostat subsequently expanding under the influence of the gas-flame so as to separate from the vibrator and break the circuit, and remaining separated therefrom during the existence of a flame.

3. In an apparatus of the character specified, a gas-burner, a valve therefor, two vertical magnets having upper and lower pole-pieces, a vertical armature pendent from a pivot above said magnets and adapted to swing vertically between said pole-pieces, and to engage the valve to open and close the same, and a pivoted vibrator adapted to be engaged and operated by said armature, the connection between the armature and the valve being a loose one to permit the armature to move away from either magnet to an intermediate position without actuating the valve.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of December, A. D. 1897.

WILLIAM E. CRAM.

Witnesses:

R. M. PIERSON,
P. W. PEZZETTI.