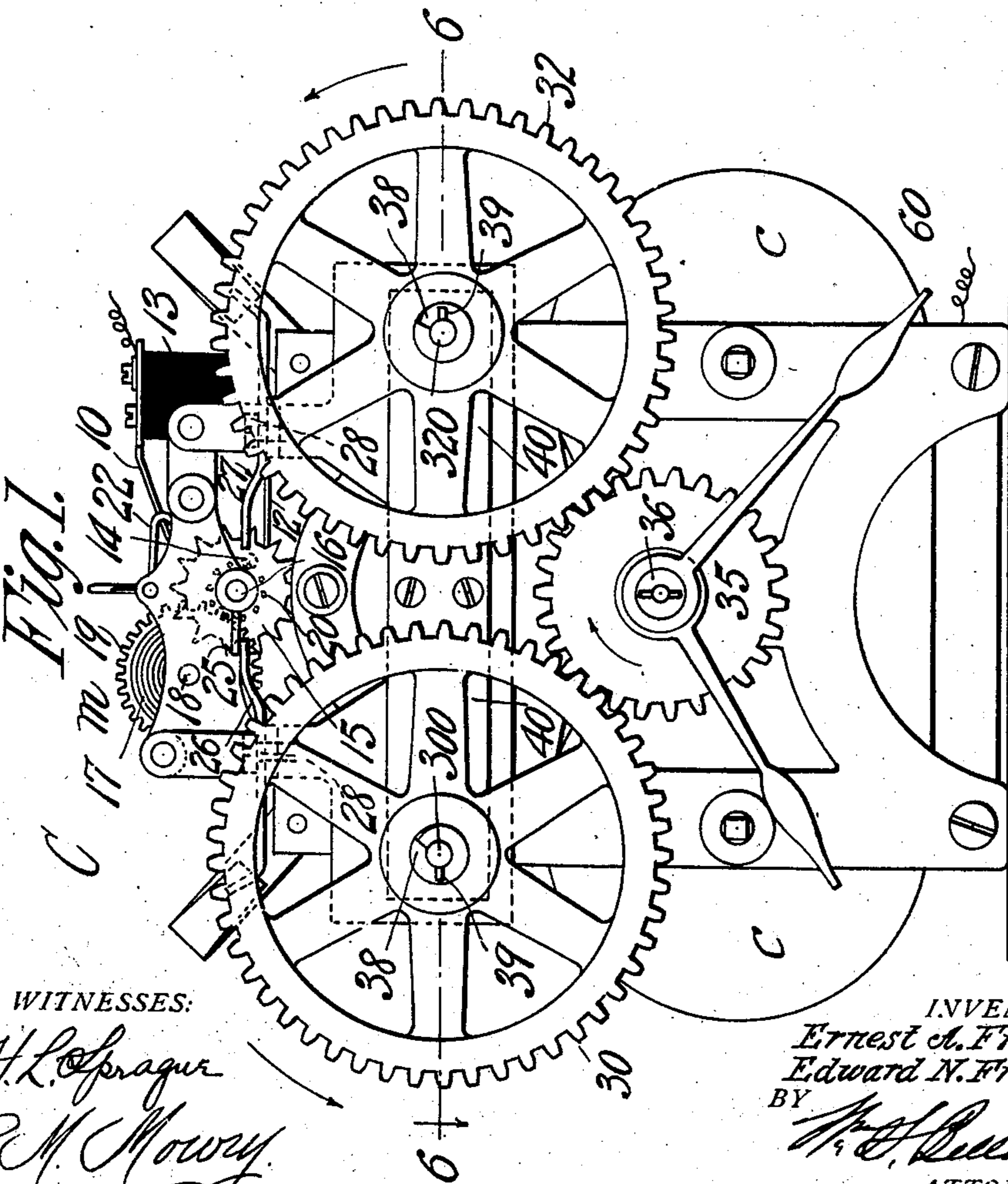
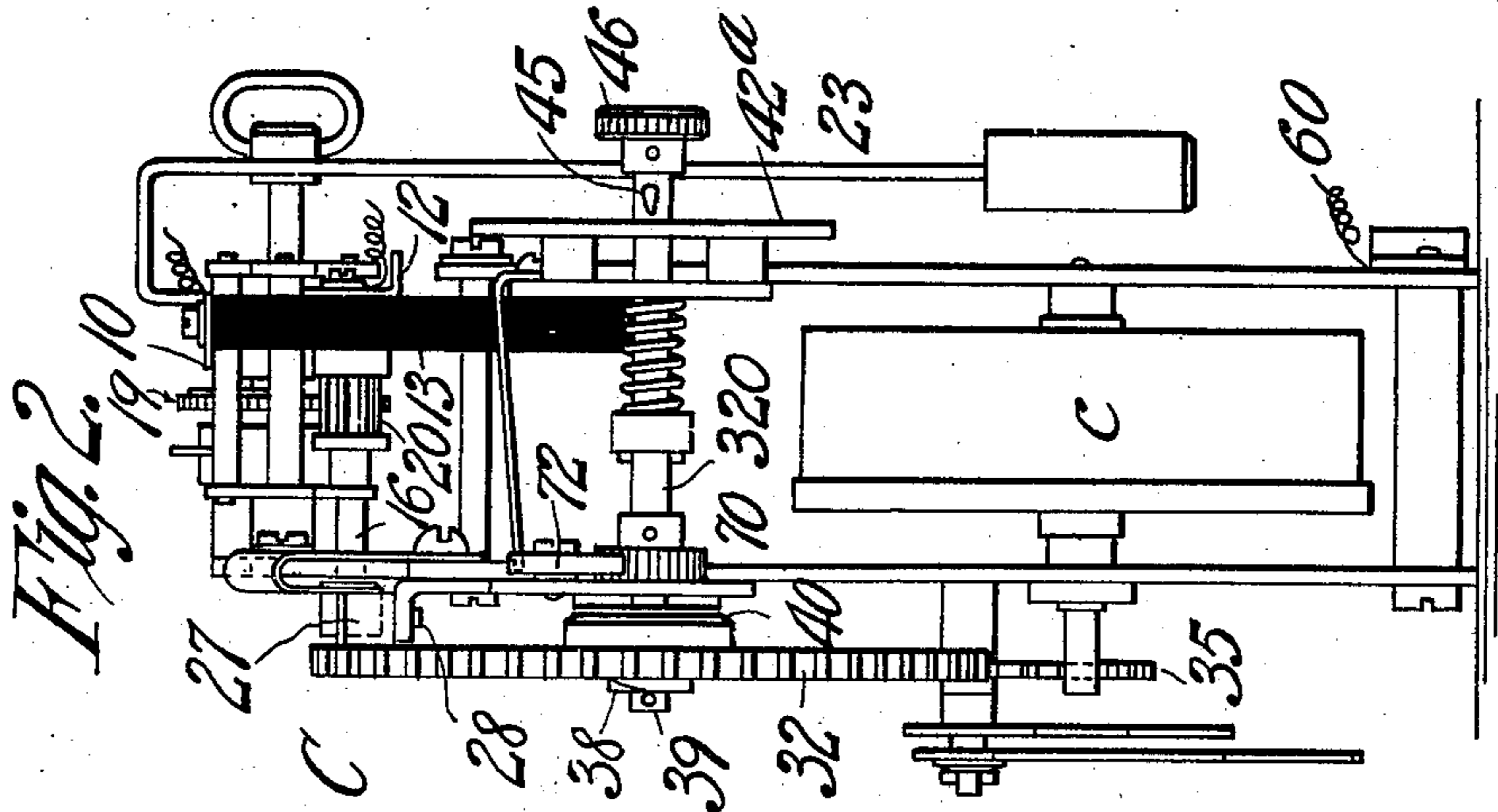


E. A. & E. N. FRARY.
CIRCUIT CONTROLLING APPARATUS FOR ELECTRIC GAS BURNERS.
APPLICATION FILED NOV. 30, 1909.

994,585.

Patented June 6, 1911.

3 SHEETS—SHEET 1.



WITNESSES:
H. L. Sprague
R. M. Mowry

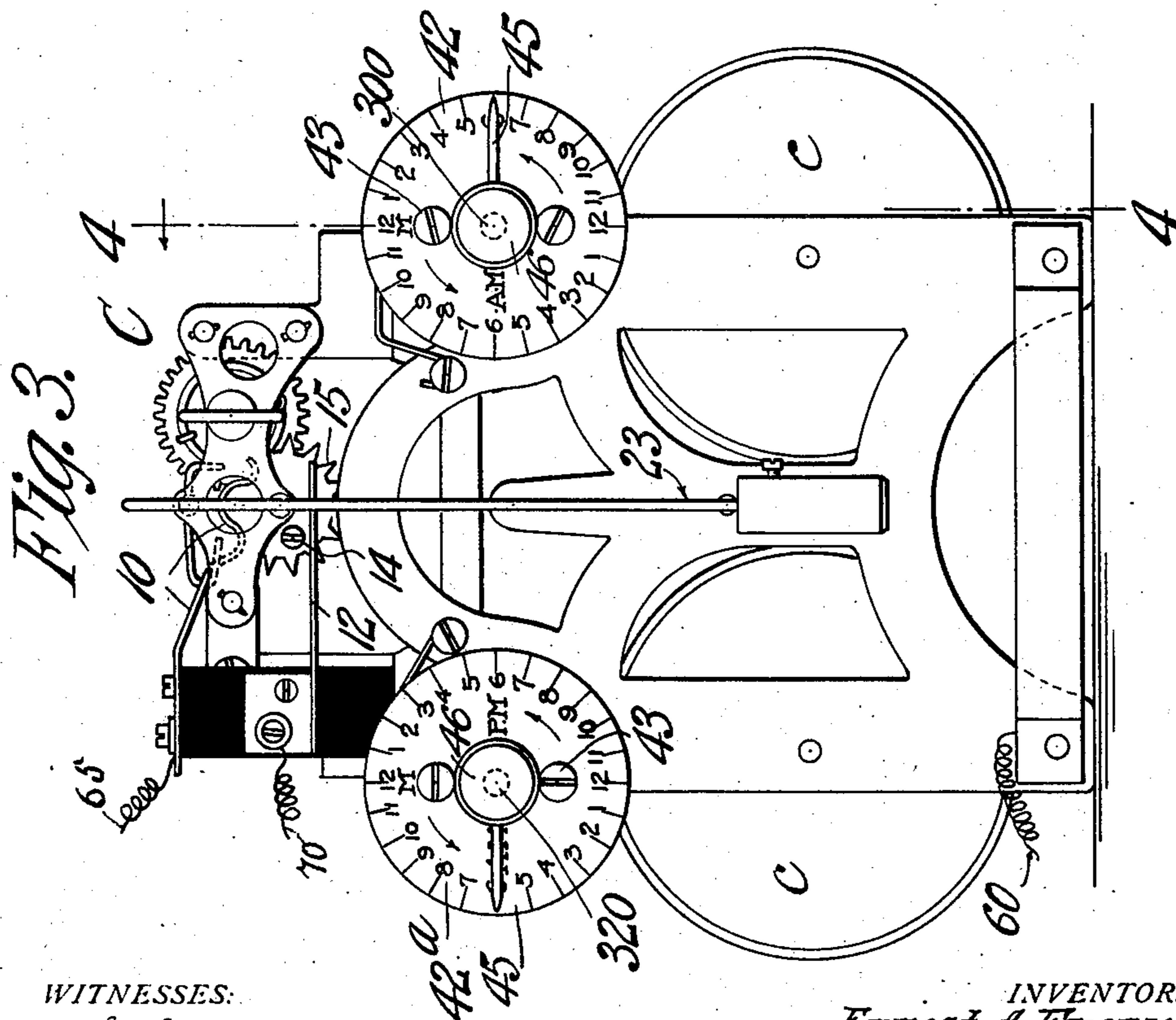
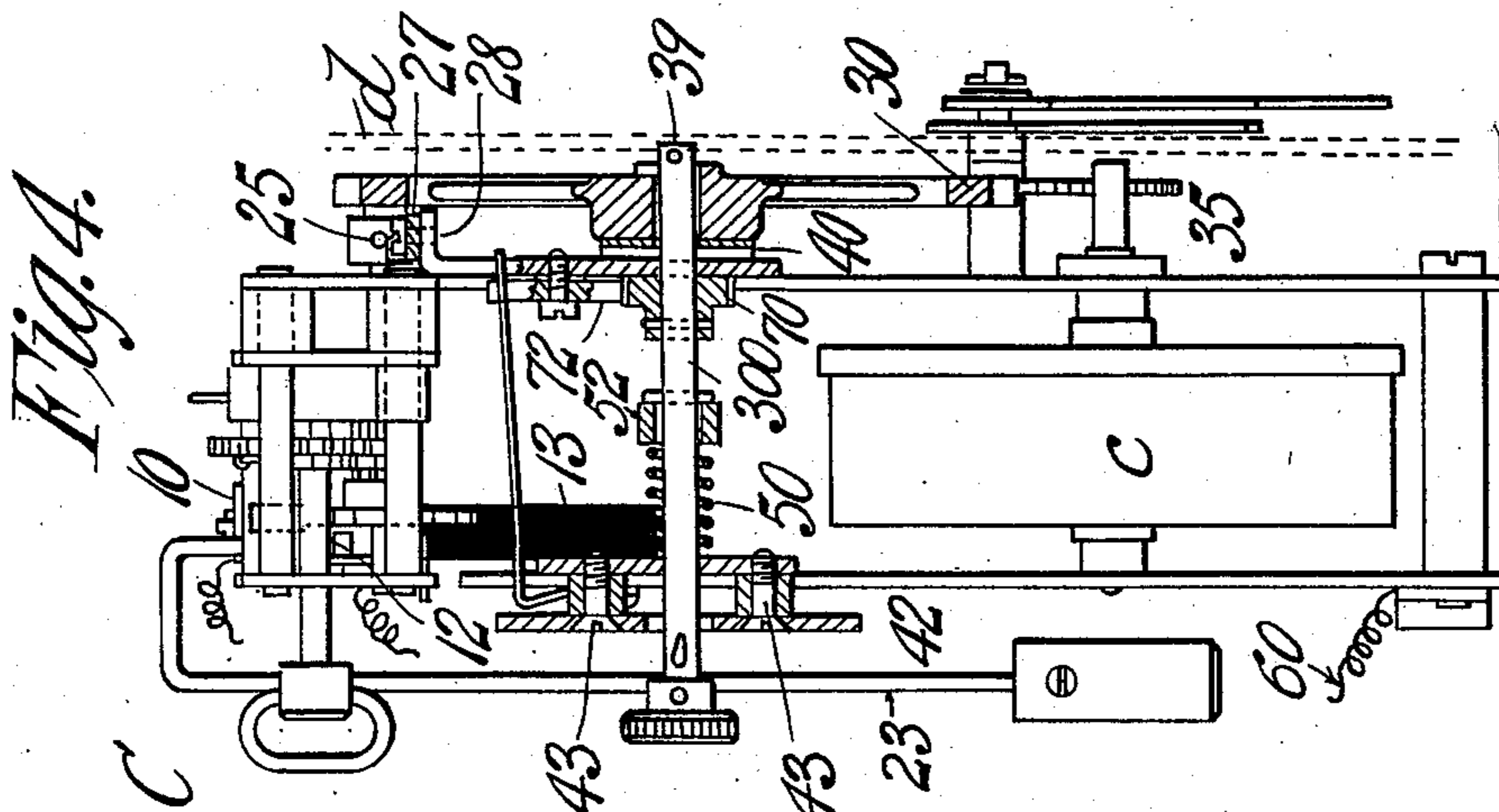
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3 SHEETS—SHEET 2.



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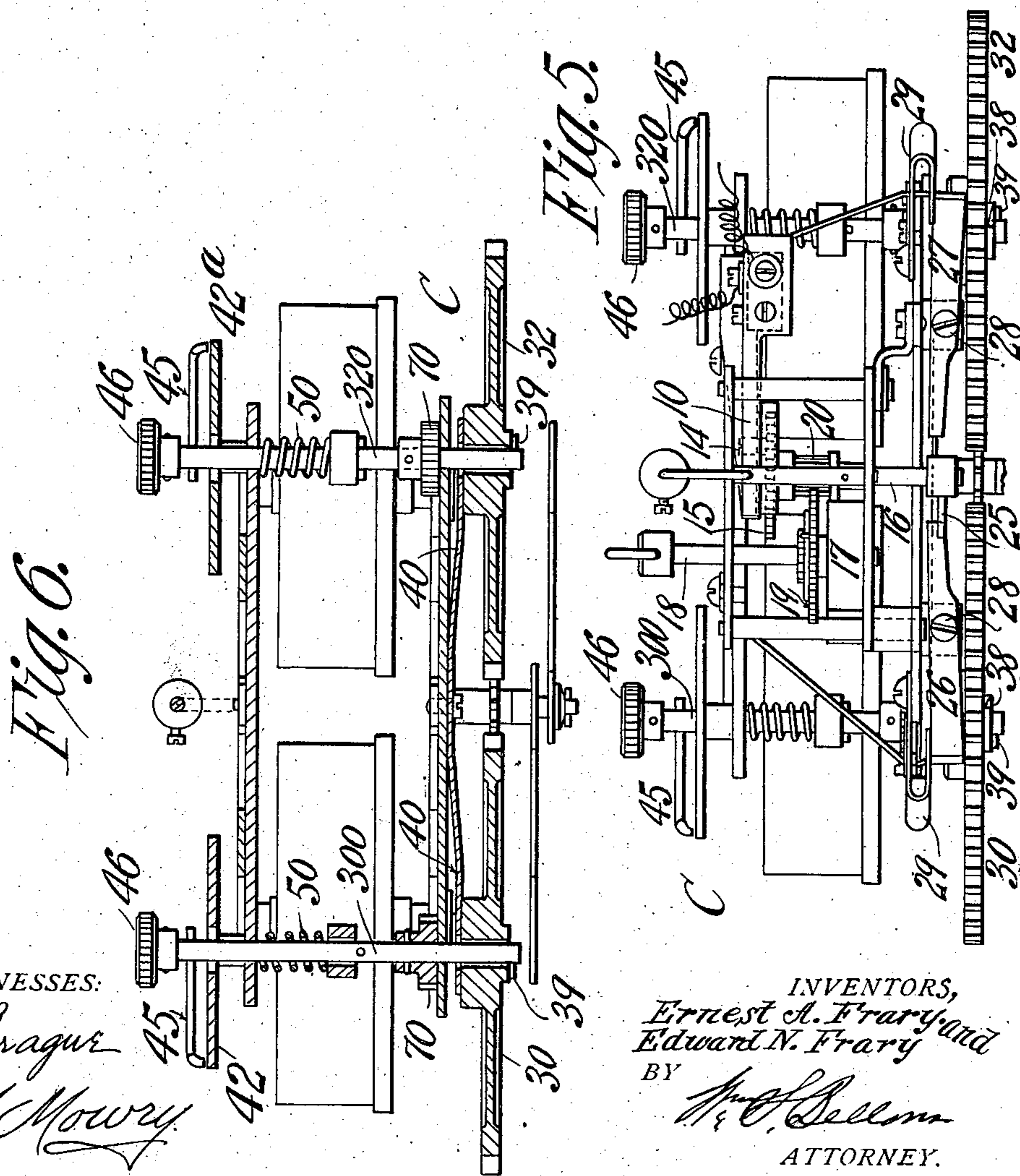
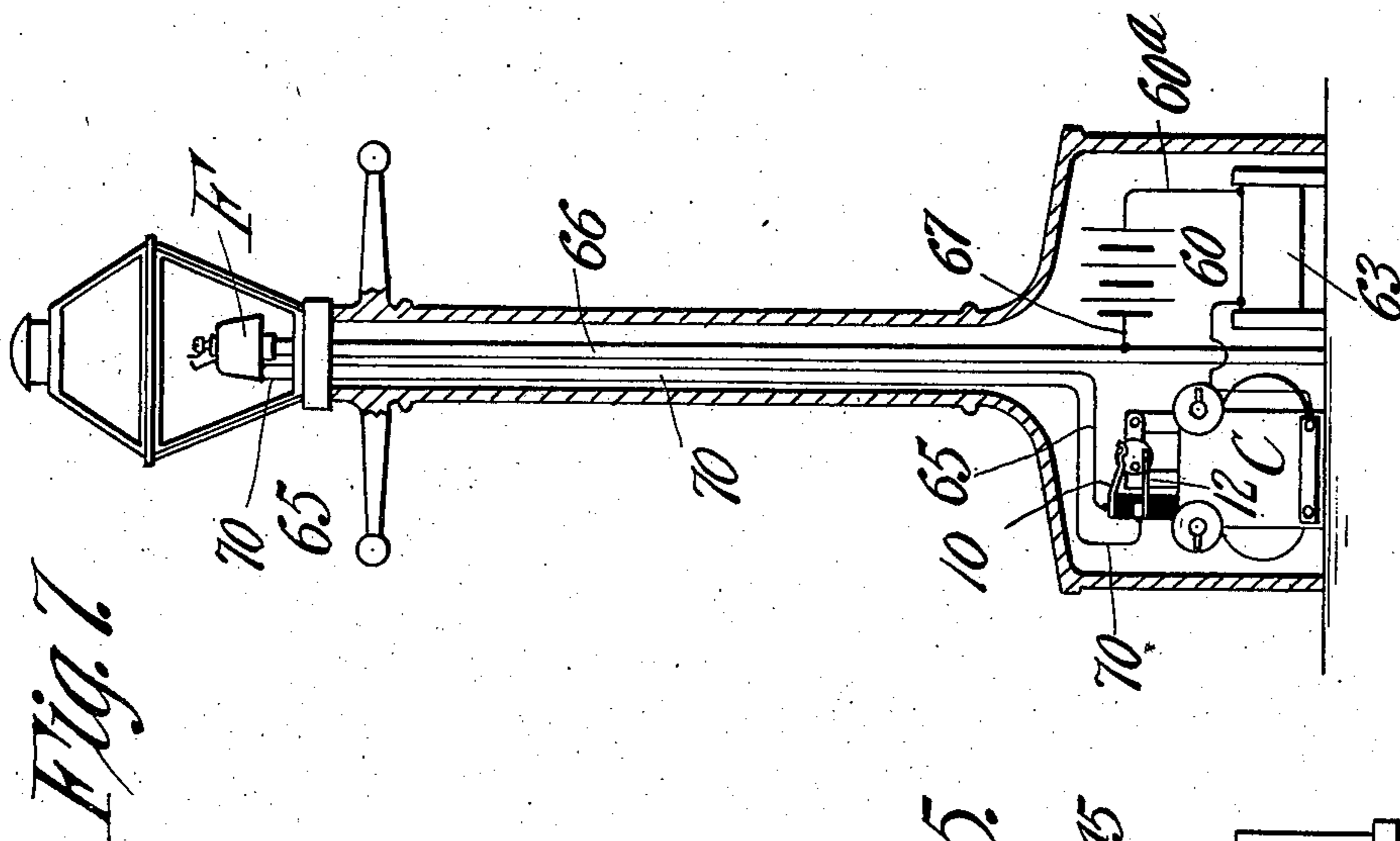
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3 SHEETS-SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ERNEST A. FRARY AND EDWARD N. FRARY, OF SOUTH DEERFIELD, MASSACHUSETTS,
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CIRCUIT-CONTROLLING APPARATUS FOR ELECTRIC GAS-BURNERS.

994,585.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed November 30, 1909. Serial No. 530,670.

To all whom it may concern:

Be it known that we, ERNEST A. FRARY and EDWARD N. FRARY, citizens of the United States of America, and residents of South Deerfield, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Circuit-Controlling Apparatuses for Electric Gas-Burners, of which the following is a full, clear, and exact description.

This invention relates to an apparatus or mechanism for the automatic lighting and extinguishing of gas, of a class such as illustrated and described in Letters Patent of the United States granted to us April 2, 1907, No. 849,116, the present invention having the characteristic in common with the one set forth in said patent, of comprising means for the establishment, and termination shortly thereafter, of different electrical circuits appurtenant to separate electromagnetic devices forming part of a device in a gas burner for both turning on and shutting off gas to the burner and also for lighting the turned on gas by a spark created by the breaking of one of the circuits.

In our former patent the means for the establishments and terminations of the circuits alternately was comprised in contrivances controlled and actuated by variations in the pressure of the gas contained in the gas supply connected with the burner; but in the present invention we provide a pair of separate contacts insulated from each other and connected with conductors comprised in the separate circuits in which the different electromagnetic devices of the gas burner are connected,—together with a movable member in electrical connection with another conductor so that such member when liberated to move will make and break a circuit, for turning on the gas and lighting it by impingement against one of the contacts, such member being then arrested for a time and thereafter liberated for a resumption of its movement whereby it will impinge against and pass away from the other contact with the result of establishing the other circuit which is effective for the turning off of the gas at the burner; and the present invention, furthermore, comprises a motor or actuator for the movable

circuit making and breaking member, a device for alternately freeing the motor so that it may run, and stopping it, and time controlled devices, that is those actuated by a clock works for in turn controlling, and at times as predetermined, the operation of the releasing and stopping device for the motor or actuator for the movable member coacting alternately with different contacts for establishing the different circuits.

By the employment of our present apparatus, a person may set the same so that at a desired time it will have an operation to automatically establish, and directly thereafter terminate, the circuit for actuating the gas burner whereby the gas is turned on and the burner lighted; and the apparatus will then resume its inactive or dormant condition and so remain for the time as predetermined in the setting of the time controlling operation thereof and will then after the lapse of as many hours as required again establish and maintain, only momentarily, the other circuit which is effective for the turning off of the gas. Thus, for instance, the gas may be turned on and the burner lighted at 6 o'clock in the evening and left to burn until 6 o'clock of the following morning.

The invention consists in the apparatus or mechanism substantially as hereinafter described in conjunction with the accompanying drawings and set forth in the claims.

In the drawings,—Figure 1 is a front elevation of the time controlling apparatus for the alternated establishment of the different circuits. Fig. 2 is an elevation of the same as seen at the right hand end thereof. Fig. 3 is a rear elevation of the same. Fig. 4 is a vertical sectional view as taken on line 4—4, Fig. 3. Fig. 5 is a plan view. Fig. 6 is a horizontal sectional view on line 6—6, Fig. 1. Fig. 7 is a diagram indicating the manner of combining an electrically actuated time controlling apparatus with the gas burner.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings,—10 and 12 represent a pair of metallic spring plate contacts mounted on a block 13 of insulating material.

The wire 65 has connection with the con-

tact 10 and forms in part a conductor for one of the electrical circuits while the wire 70 is connected with the contact 12 and forms in part the conductor for the other electrical circuit.

14 represents the movable member which alternately impinges against the contacts 10 and 12, the same being in the present instance represented as a stud projecting rearwardly from the face of a toothed wheel 15 on an arbor 16 which extends horizontally and transversely at the upper part of the metallic framing of the mechanism.

m represents the motor for actuating, accordingly as it is permitted so to do, the revoluble contact engaging member 14.

For the provision of an adequate motor for this purpose, the somewhat common and well known spring motor employed in alarm clocks is appropriated,—17 representing the clock spring which is wound around and reacts on the arbor 18 which has affixed thereto a spur gear wheel 19 which meshes into the lantern pinion 20 on the arbor on which the toothed wheel or circular part 15 carrying the contacting member 14 is mounted.

The ordinary form of governor is combined with the toothed wheel 15, the same comprising the pivoted escapement 22 mounted to rock on a horizontal axis and having a rearwardly offset and downwardly extending pendulum 23, this class of device serving to steady and render gradual the rotary movement of the arbor 16 when freed to be rotatively driven, always in the same direction, by the spring motor.

On the same arbor 16, by which the revoluble contact engaging member 14 is carried, is a radial stud or arm 25,—forward of the member 14 and well to the front of the apparatus. For coaction with this revoluble arm 25 are provided a pair of detent plates 26 and 27 each intermediately fulcrumed on the pivot 28 therefor for a swinging movement on a horizontal plane, and their outer ends are upturned and receive engagements therewith of bent flat metal springs 29, the reaction of which is in a direction to swing the outer ends of the detent plates forwardly against the inner faces of the large spur gear wheels 30 and 32, their inner ends at such times rearwardly moving.

The large spur gear wheels 30 and 32 are mounted to rotate on, and independently of, horizontal shafts 300 and 320, which are horizontally and transversely supported in parallelism in the framing of the machine, and which shafts themselves are revolubly adjustable. These wheels 30 and 32 are both caused to be concurrently rotated once every 24 hours by a clock mechanism of which C C are the spring barrels, which are operative to impart, through a gearing train (not necessarily here shown), a rotary motion to the

hour hand shaft or arbor 36 on which the spur gear 35 is fast, it being here mentioned that this gear will rotate as a part of the clock works once every 12 hours and that the wheels 30, 32, in mesh with and double the diameter of the wheel 35 will rotate once in a day.

The gear wheels 30 and 32 are made much wider at their edges than the gear 35 so that, notwithstanding the fact that the gears 30 and 32 will be bodily slightly shifted first forwardly and then with returning movements rearwardly, these gears will always remain in mesh with the gear 35 understood as a part of the clock works. The said gears 30 and 32 are made at the hub portions adjoining the shafts 300 and 320 with recesses, the faces 38 of which are inclines or cams; and at the outer end portions of the shafts 300 and 320 are radial studs 39 which serve as stops for preventing, for the most of the time, said gear wheels from having their slight degree of outward sliding movement on their shafts; but, of course, when one of the gear wheels 30 or 32 has been so turned, by the clock mechanism, that the recess at the hub portion thereof comes to registry with the radial stud, such gear wheel will be free to be outwardly shifted until the inner wall of the recess strikes the radial stud,—the extent of such outward shifting movement being equal to the depth of the recess; and the outward movement of the gear wheels are insured by the flat spring 40 shown in Figs. 1, 3, 4 and 6, the extremities of which bear against the rear hubs of such wheels and react in a forward direction.

At the rear of the framing and in positions concentric with the axes of the shafts 300 and 320 are time indication disks 42, 42^a, the same being as represented in Figs. 3 and 4, affixed on the frame by the screws 43. These disks are centrally apertured for the free passage therethrough of the shafts 300 and 320, and they have on their rear face regularly spaced marks or notches, 24 in number, representing the 24 hours of the day and bearing the numbers from 1 to 12 around the one-half of the face and the repetition of such numbers, 1 to 12, around the other half of the face; and each shaft 300 and 320 has a pointer arm 45 for registering with the hour indicating marks or notches and also a handle or knob 46 for conveniently turning the shaft for setting the portions of the mechanism which comprise said shafts. The said shafts, the forward ends of which form supports on which the wheels 30, 32, are mounted for their rotations, themselves being independently rotatable, are so mounted in the framing as to have a very slight endwise movement; and, as shown more particularly in Fig. 4, a spiral spring 50 encircles each shaft and is in more or less compression between a collar 52 on the shaft

and a portion of the frame, so that each shaft is subjected to a longitudinal forwardly directed pressure whereby its pointer 45 will be under tension in its engagement with the hour indicating marks or notches on the rear face of each disk 42 or 42^a.

As this invention comprises prominently an apparatus having a movable member (revolvable stud 14), which is understood as in electrical connection with a conductor which may be in common to, and in part form, either of two distinct circuits having separate contacts, connected with which are conductors comprised in the separate circuits with means for causing establishment and termination of the one circuit and then of the next at any times as predetermined, the particular manner of making the connections and arranging the conductors in conjunction with a suitable battery or generator may be largely varied and carried out in any one of many ways manifest to an electrician; but in the present case a practical and efficient manner of wiring and providing the conductors for the two distinct circuits are indicated: In the diagrammatic view, Fig. 7, C represents the time controlling apparatus which is mechanically shown in the other views; and the wire 60 is connected with the frame of the apparatus which is of brass and in which an arbor 16 carrying the revoluble member 14 is mounted so that there is an electrical connection between said wire 60 and said revoluble member,—the wire 60 having connection with the frame as aforesaid, being also connected with the battery 62, while the length of wire 60^a is understood as a continuation of the one 60, these wires 60 and 60^a being connected with a spark coil 63.

At the upper part of Fig. 7 is represented an electrically controlled gas burner F, which in detail may be like the one sufficiently shown and described in our aforesaid Letters Patent of Apr. 2, 1907. Such gas burners are operated by two circuits, one actuating the electromagnetic devices for turning on the gas and also producing a spark for lighting the turned on gas and such circuit may be found to be constituted by a wire 65 running from the contact 10 into the burner, the return connection being by the pipe, post, or conductor, 66, with which the wire 67 is connected, such wire being also connected to the opposite pole of the battery from that which the wire 60^a is connected so that when the revoluble member 14 in electrical connection with the wire 60 is on the contact 10, the electromagnetic device in the gas burner will be actuated to open the gas cock and then, as such circuit is broken, at the instant the revoluble member 14 leaves the contact 10, the spark will be produced. The other circuit for actuating the electromagnetic device which closes the

gas cock may be here understood as established when the revoluble member 14 is on the contact 12, the same from the battery being by wire 60^a through the spark coil and wire 60, through the metallic frame of the apparatus C to the revoluble member 14, thence by wire 70 to and through the gas burner, returning from the battery by the conductor 66 and wire 67.

The manner of establishments of the circuits having been exemplified, the manner of operation of the apparatus will now be explained.

It will be assumed, for the sake of example, that it is desired that the apparatus shall make and break the circuit for turning on the gas and lighting it at 6 p. m., and shall shut off the gas at 6 a. m. Therefore, the shaft 300 will, as shown in Fig. 3, be adjusted so that its pointer 45 is in registry with numeral 6 on the p. m. side of disk 42, and the shaft 320 will be adjusted so that its pointer is on the numeral on the other disk 42^a indicating 6 a. m. The relations of the pointers 45 and the radial studs 39 being fixed and the clock mechanism assumed to be running on correct time, as may be assured by the minute and hour hands showing on the clock dial, the latter being represented only by dotted lines at *d* in Fig. 4, so soon as the clock-works has caused the wheel 30 to be turned so far that its recess 39 is brought to registry with the radial stud, the wheel 30 will by its spring 40 be forwardly forced a slight distance with the result of permitting the detent plate 26 to be swung horizontally by the pressure of its spring 29, thus releasing the engagement between such detent and the radial arm 25. This releasing of the radial arm frees the shaft 16 so that it may be rotated by the very rapid motor in which the spring 17 is comprised, it being here recalled that the spur wheel 19 rotated by the motor spring 17 and meshing with the lantern pinion 20 turns the shaft and the toothed wheel 15 on which the contact engaging stud 14 is revolvably carried. And thus the said contact stud will have a revoluble movement throughout half a cycle from a position between the contacts and will come to impingement against, and pass away from, the upper contact, its progress in the circular course for more than half a revolution being arrested by the radial arm 25 on shaft 16 coming under and being arrested by the other detent plate 27. Now the gas having been lighted and remaining turned on will continue burning until 6 o'clock of the following morning, whereupon the recess 38 in the hub portion of the wheel 32 will come to registry with the radial stud on shaft 320, and such radial stud will no longer continue, uninterruptedly, to maintain the wheel 32 in its inwardly slid relation on the

extremity of the shaft 320, but on the other hand, said wheel 32 will be outwardly crowded by the flat spring 40, leaving the detent plate 27 free to be swung by its spring 29 so that the inner end portion of such detent plate is removed from its position as a stop for the radial arm 25, whereupon the motor actuated shaft 16 is again free and is revolved half a turn until the radial arm is again intercepted by the detent plate 26 appurtenant to the wheel 30; and in this last mentioned half rotation of the shaft 16, the contact engaging stud 14 wipes across the contact plate 12 and establishes the other circuit,—the one effective for the turning off of the gas.

After, for instance, the wheel 30 is released to have its bodily outward movement by the registration of its recess with the radial stud 39 on the shaft 300 to result in the throwing of the detent plate so as to release the radial arm 25 and whereupon after such release such radial arm is, after the half turn, arrested by the other detent plate 27, the said wheel by the said clock-works mechanism will, in a short time be so turned as to carry its recessed hub portion beyond the radial stud 39; and the base wall of such recess being made as a cam or incline, as heretofore stated, its effect will be, by its engagement with the radial stud, to cam or crowd the wheel against the spring 40 to its inwardly shifted position, and in so doing will restore the detent plate 26 to its normal position so that after the lapse of time intervening between the establishment of the lighting circuit and the establishment of the extinguishing circuit when the other wheel 32 is permitted to have its shifting movement bodily outward, to permit the resumption of the rotation of the radial arm 25, the detent 26 will be, properly, in its position for arresting such arm; and identically the same cam action for restoring the wheel 32 to its inwardly shifted position is automatically performed because of the coaction of the cam formed base of the recess in the hub portion of the wheel 32 with the radial stud 29 of the shaft 320.

There being a considerable degree of frictional engagement between the outer face of the hub portion of the wheels 30 and 32 against the radial studs 39 carried by the shafts 300 and 320, which might have a tendency of inducing rotative movements of these shafts in unison with the wheels 30 and 32, and which would result in rendering the apparatus unreliable, we have provided notched or ratchet toothed wheels 70 affixed on the shafts 300, 320, and have associated with them spring detent pawls 72 which operate against any tendency of the wheels 30 and 32 to carry the setting shafts 300 and 320 around with them; but these pawl and ratchet devices do not interfere with the ro-

tations of the shafts in directions opposite the rotations of the gear wheels 300, 320 for the proper time setting of the apparatus.

While we have represented our apparatus as one of duplex character and operative for the establishment and termination alternately of different circuits, novelty is comprised in certain portions of the apparatus available for the making and breaking of a circuit at a predetermined time efficient and serviceable in situations other than in connection with a gas lighting and extinguishing device; and the invention is not, therefore, limited, necessarily, to a controlling device of duplex character as here illustrated.

We claim:—

1. In an apparatus of the character described, a pair of separate normally open electric circuits each having a contact, an electrical conductor comprised as a part of each of the circuits, and a movable member, having connection with such electrical conductor, to have engagements alternately with said contacts, a motor for exerting a moving force to said movable member, detents shiftably mounted and operative to have positions for arresting and for freeing the said movable member, means coacting with, and for shifting the detents, and a clock mechanism for operating, and chronologically controlling, the action of the detent shifting means.

2. In an apparatus of the character described, an electric gas lighting and extinguishing burner, and three conductors comprised in separate normally open circuits for controlling the operation of said burner, separated contacts respectively in electrical connection with the conductors of the different circuits, burner operating circuits, a movable member, having a connection with one of said electrical conductors which is comprised as appurtenant to both circuits, adapted to have engagements alternately with said contacts, and thereby to be included alternately in both said circuits, a motor for exerting a moving force to said movable member, detents shiftably mounted and operative to have positions for arresting and for freeing the said movable member, means coacting with and for shifting the detents, and a clock mechanism operating and chronologically controlling the action of the detent shifting means.

3. In an apparatus of the character described, three electrical conductors comprised in a pair of separate normally open circuits, separated contacts respectively in electrical connection with a conductor of each of the different circuits, a revolubly movable member connected with one of said conductors which is appurtenant to both of said circuits, to have engagements alternately with said contacts, a motor for exerting a revolving force to said member, de-

tents shiftably mounted and operative to have positions for alternately arresting and freeing the said revoluble member, means co-acting with and for shifting the detents, and
 5 a clock mechanism operating and chronologically controlling the action of the detent shifting means.

4. In an apparatus of the character described, three electrical circuits comprised
 10 in a pair of separate normally open circuits, of both of which one of the conductors is an appurtenance, separated contacts connected with a conductor of each of the different
 15 circuits, a shaft rotatably mounted, having connection with the electrical conductor which is appurtenant to both of the circuits, and carrying a revoluble stud arranged be-
 20 tween, and in its circular movement to have alternate engagements with said contacts, and carrying a radial arm, a motor for ex-
 25 erting a rotating force to said shaft, a pair of detents shiftably mounted and operative to have positions for alternately intercept-
 30 ing and being free from the radial arm revoluble with said shaft, means coacting with and for shifting the detents, and a clock mechanism controlling the action of the de-
 35 tent shifting means.

5. In an apparatus of the character de-
 30 scribed, electrical conductors forming a circuit and a contact having connection with one of the conductors, a shaft having con-
 35 nection with the other electrical conductor of the circuit provided with a stud revoluble therewith for engagement with said contact
 40 and having a radial arm, a motor for imparting a rotating force to said shaft, a detent which is shiftably across and away from the plane of revolution of said radial arm,
 45 shifting means for said detent, and a clock mechanism operating and chronologically controlling the action of the detent shifting means.

6. In an apparatus of the character de-
 45 scribed, electrical conductors forming a circuit and a contact having connection with one of the conductors, a shaft, having con-
 50 nection with the other electrical conductor of the circuit, revolubly carrying a contact-engaging member offset from its axis, and provided with a radial arm, a motor for ex-
 55 erting a rotating force to said shaft, a detent shiftably to lie across and be removed from the plane of revolution of said radial arm, a time setting shaft having a radially
 60 extending stud, a wheel mounted for rotation on and independently of said setting shaft and also movable axially relatively to said shaft, having a recess in its shaft en-
 circling portion, a spring for forcing the wheel outwardly against the side of the wheel, and a clock mechanism having a ro-
 65 tating connection with said wheel.

7. In an apparatus of the character de-
 65 scribed, electrical conductors forming a cir-

cuit and a contact having connection with one of the conductors, a shaft, having con-
 70 nection with another of the electrical conductors of said circuit revolubly carrying a contact-engaging member offset from its axis, and provided with a radial arm, a mo-
 75 tor for exerting a rotating force to said shaft, a detent shiftably to lie across and be removed from the plane of revolution of said radial arm, a time setting shaft having
 80 a radially extending stud, a wheel mounted for rotation on and independently of said setting shaft and also movable axially relatively to said shaft, having a recess in its shaft encircling portion, the base of which
 85 is inclined outwardly to the face of the wheel, a spring for forcing the wheel outwardly against said radial stud, a spring for maintaining the detent against the side of the wheel, and a clock mechanism having
 90 a rotating connection with said wheel.

8. In an apparatus of the character de-
 90 scribed, electrical conductors forming a circuit and a contact having connection with one of such electrical conductors, a shaft having connection with another one of said
 95 electrical conductors, revolubly carrying a contact engaging member offset from its axis, and provided with a radial arm, a motor for exerting a rotating force to said
 100 shaft, a detent shiftably to lie across and be removed from the plane of revolution of said radial arm, a time setting shaft having a radial stud, a wheel mounted for rotation
 105 on and independently of said time setting shaft and also movable axially relatively thereto, and having a recess in its shaft encircling portion, a spring for maintaining the detent against the wheel, a clock mecha-
 110 nism having a rotating connection with said wheel, a dial having time indicating works thereon, and a pointer on the time setting shaft adapted to register as the setting shaft is turned with a desired one of the said in-
 115 dicating marks.

9. In an apparatus of the character de-
 115 scribed, electrical conductors forming a circuit, a contact having connection with one of such electrical conductors, a shaft having connection with another of said electrical
 120 conductors, revolubly carrying a contact engaging member offset from its axis, and provided with a radial arm, a motor for exerting a rotating force to said shaft, a de-
 125 tent shiftably to lie across and be removed from the plane of revolution of said radial arm, a time setting shaft having a radial stud, a wheel mounted for rotation on and independently of said time setting shaft and
 130 also movable axially relatively thereto, and having a recess in the shaft encircling portion, a spring for forcing the wheel outwardly against said radial stud, a spring for maintaining the detent against the wheel, a clock mechanism having a rotating con-

nection with said wheel, a dial having time indicating works thereon, a pointer on the time setting shaft adapted to register as the setting shaft is turned with a desired one of the said indicating works, and a spring exerting an endwise force on the setting shaft, for tensioning the pointer in its engagement against the face of the dial.

10. In an apparatus of the character described, electrical conductors forming a circuit, a contact having connection with one of such electrical conductors, a shaft having connection with another of said electrical conductors, revolubly carrying a contact engaging member, and provided with a radial arm, a motor for exerting a rotating force to said shaft, a detent shiftable to lie across and be removed from the plane of revolution of said radial arm, a time setting shaft, having a radial stud, and a toothed wheel affixed thereon, a pawl mounted on a fixed support and engaging said toothed wheel, a wheel mounted for rotation on and independently of said time setting shaft and also movable axially relatively thereto, and having a recess in its hub portion, a spring for forcing the wheel outwardly against said radial stud and a spring for maintaining the detent against the wheel, and a clock mechanism having a rotating connection with said wheel.

11. In an apparatus of the character described, a pair of separated contacts, a shaft revolubly carrying a contact engaging mem-

ber offset from its axis, and provided with a radial arm, two normally open electric circuits comprising three conductors, two of which have connection respectively with said contacts, and the third, being in common to and an appurtenance of both circuits having connection with said shaft, a motor for exerting a rotating force to said shaft, a pair of detents located at opposite sides of said shaft and shiftable to have positions across and to be removed from the plane of revolution of said radial arm, a pair of time setting shafts, each having a radially extending stud affixed thereon, a pair of gear wheels mounted for rotations on and independently of said setting shafts, and also movable axially relatively thereto, and having recesses in the faces of their portions encircling the shafts and contiguous to the radial studs of the time setting shafts, means for forcing the shaft yieldingly outwardly against the said radial studs, springs for maintaining the detents against the sides of said gear wheels, and a clock mechanism including a gear which is in mesh with both said recessed gear wheels.

Signed by us at Springfield, Mass., in presence of two subscribing witnesses.

ERNEST A. FRARY.
EDWARD N. FRARY.

Witnesses:

WM. S. BELLOWS,
G. R. DRISCOLL.