J. G. BLESSING.

TELEPHONE SYSTEM.

APPLICATION FILED DEC. 21, 1908.

1,119,394.

Patented Dec. 1, 1914.

6 SHEETS—SHEET 1.

Fig. 1.

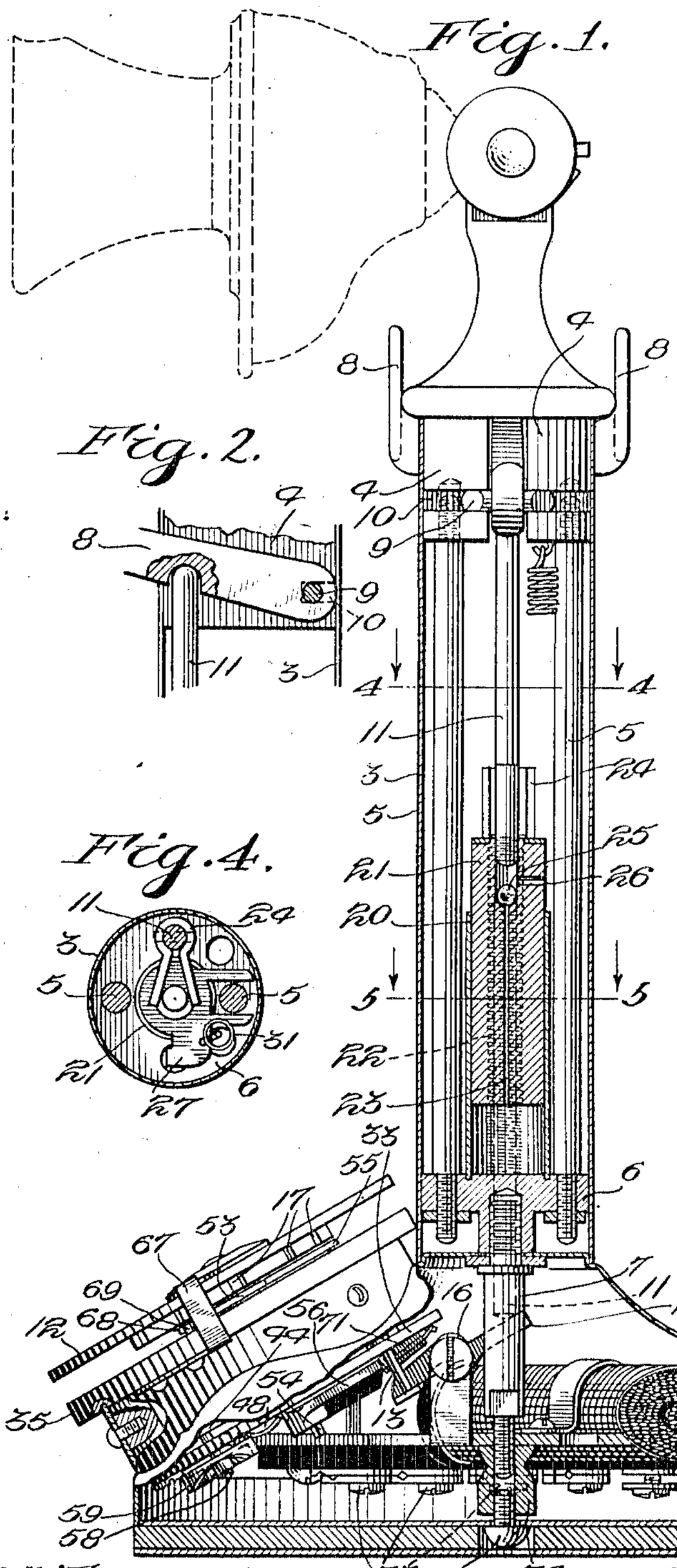

Fig. 3.

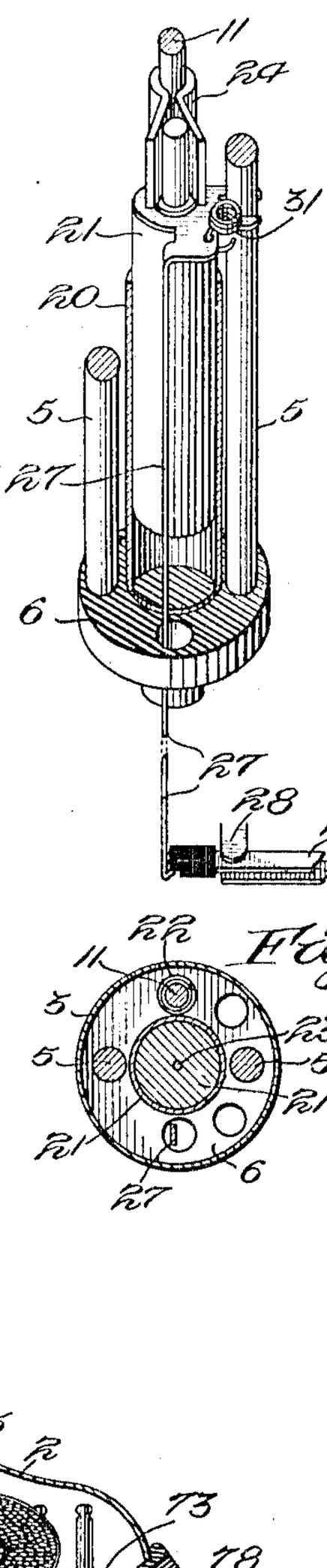

Fig. 2.

Fig. 4.

Fig. 5.

Witnesses.

P. H. Burfeind

A. B. Sperry.

Inventor:

John G. Blessing,

By Bulkley Durand & Drury.

Attorneys.

J. G. BLESSING.

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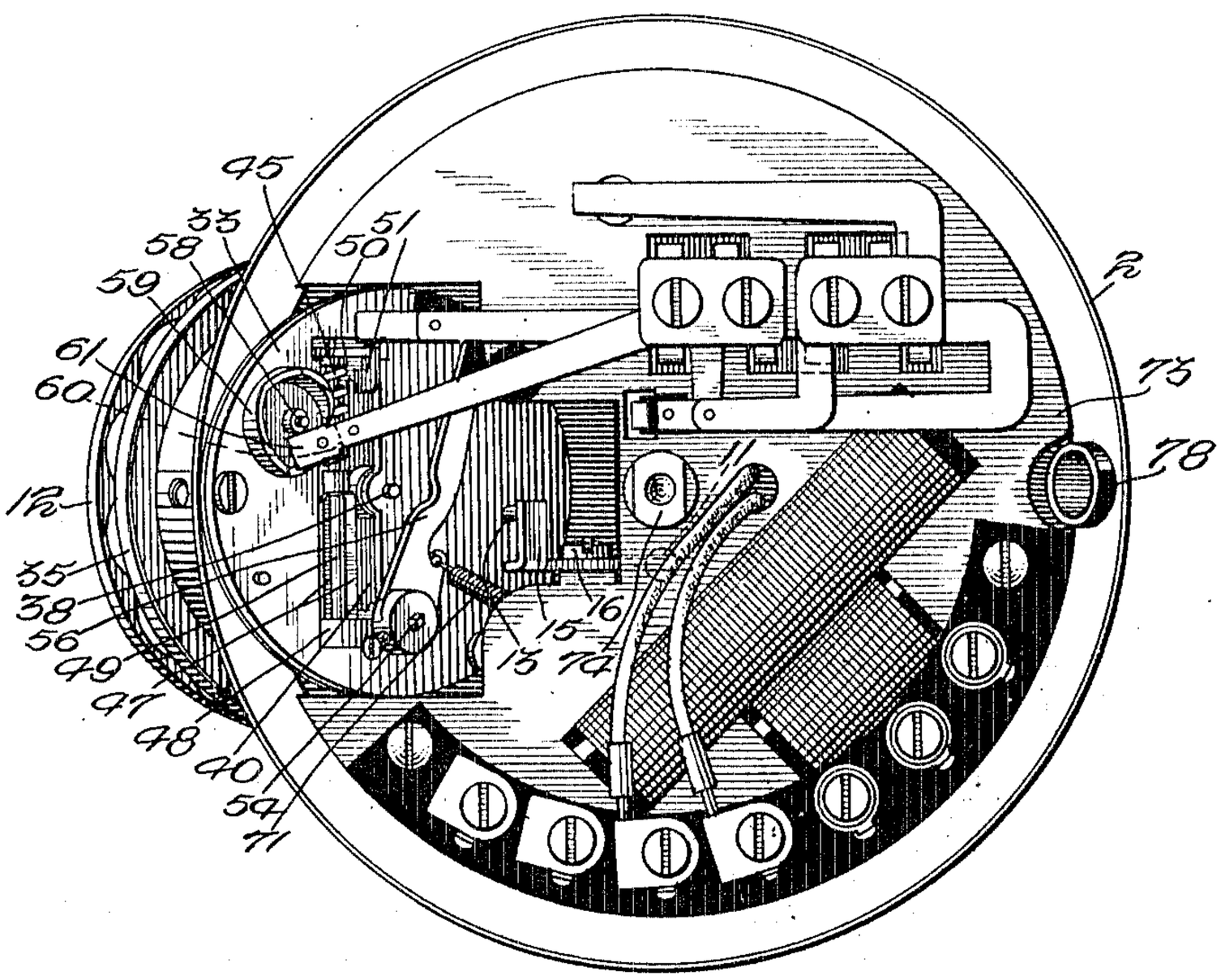
6 SHEETS—SHEET 2.

Fig. 6.



Witnesses.

P. H. Burfeind

A. B. Spurgy.

Inventor:

John G. Blessing,

By Bulkley Brand & Drury.

Attorneys.

J. G. BLESSING.

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6 SHEETS—SHEET 3.

Fig. 9.

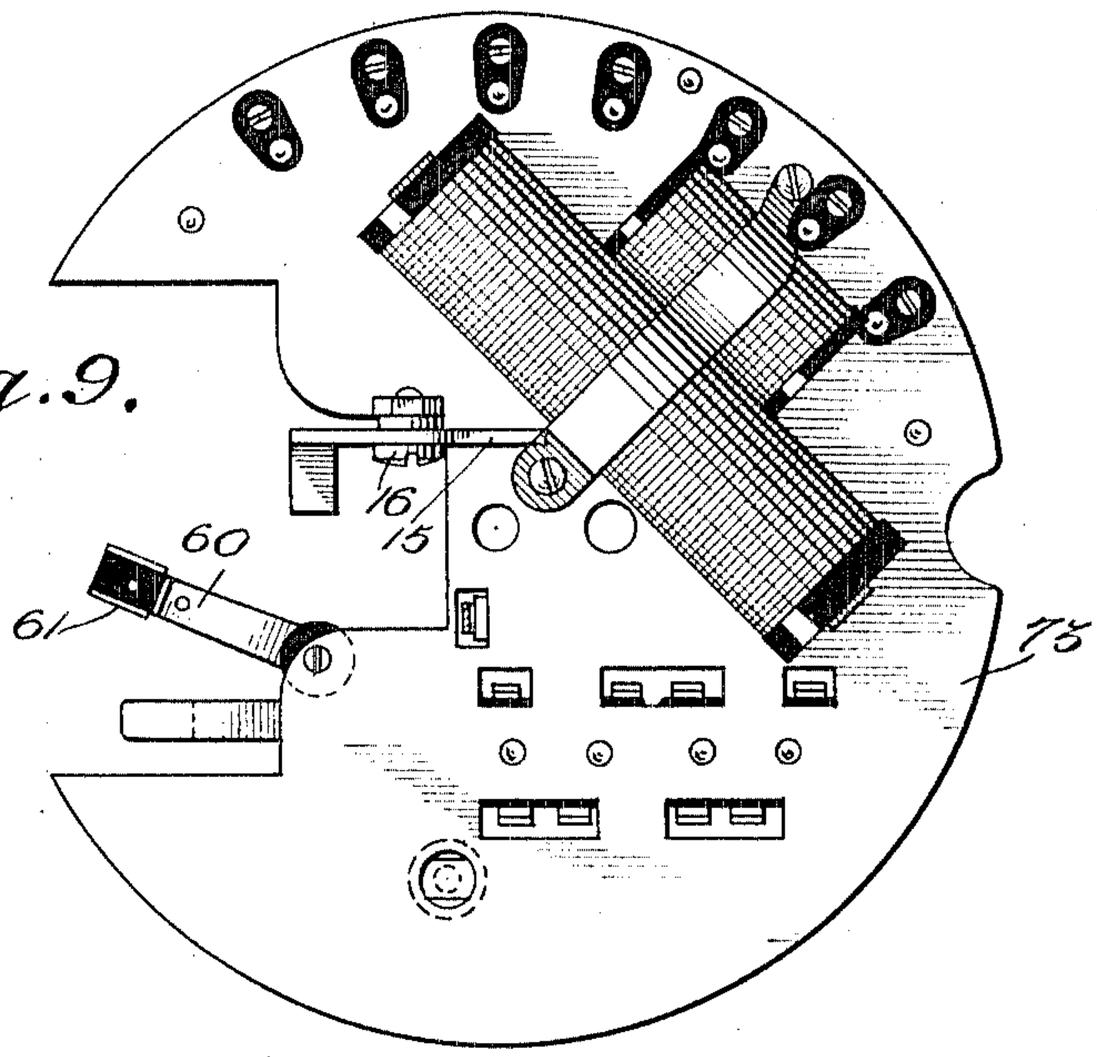
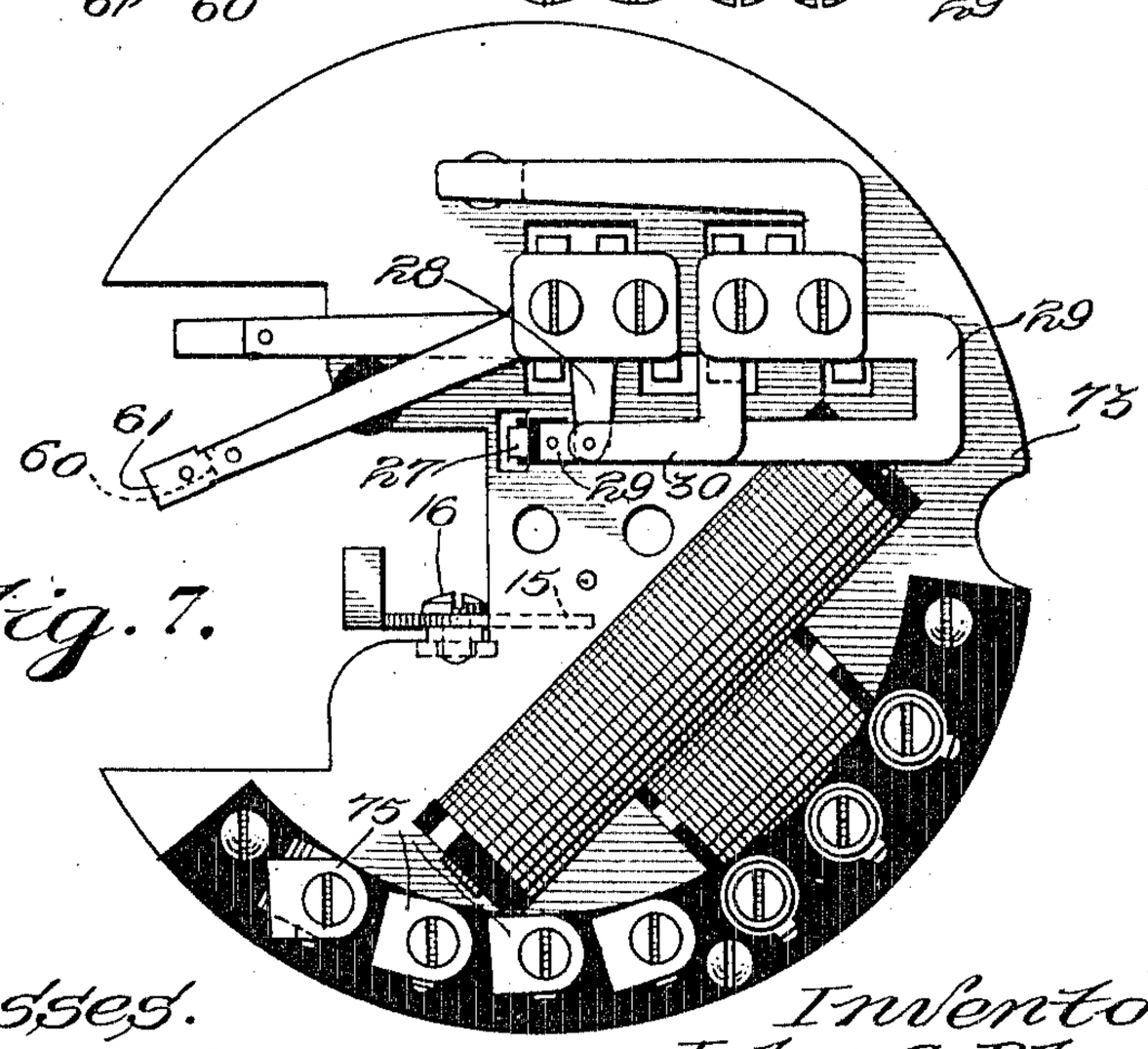


Fig. 8.

Fig. 7.



Witnesses.
R. H. Burfeind
A. B. Drury.

Inventor:
John G. Blessing,
By Bulkley Duval & Drury.
Attorneys.

J. G. BLESSING.

TELEPHONE SYSTEM.

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6 SHEETS—SHEET 4.

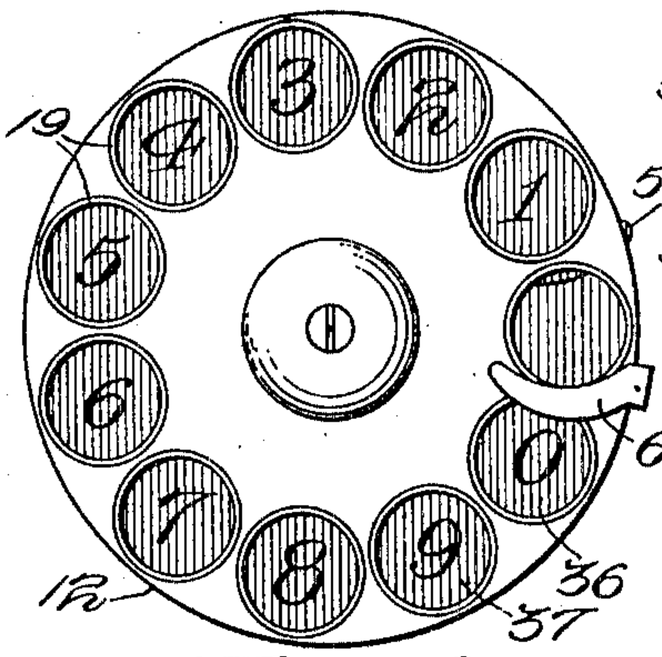

Fig. 10.

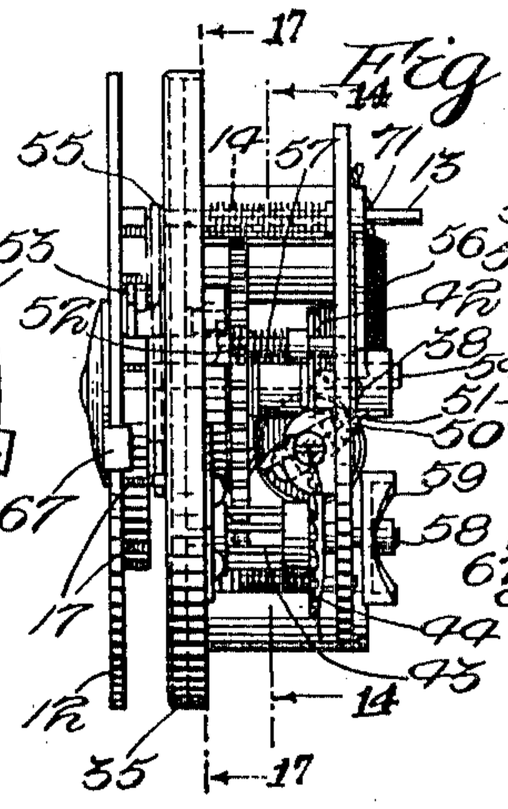

Fig. 11.

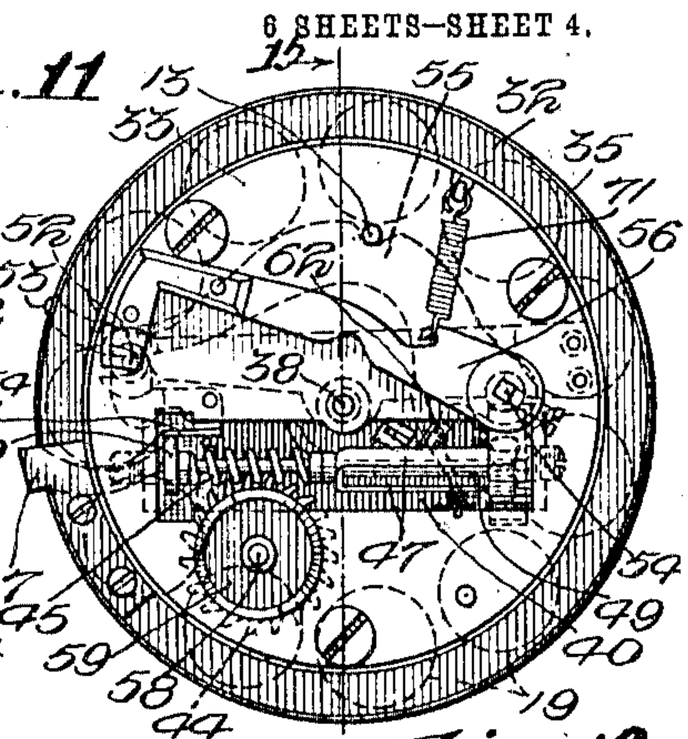

Fig. 12.

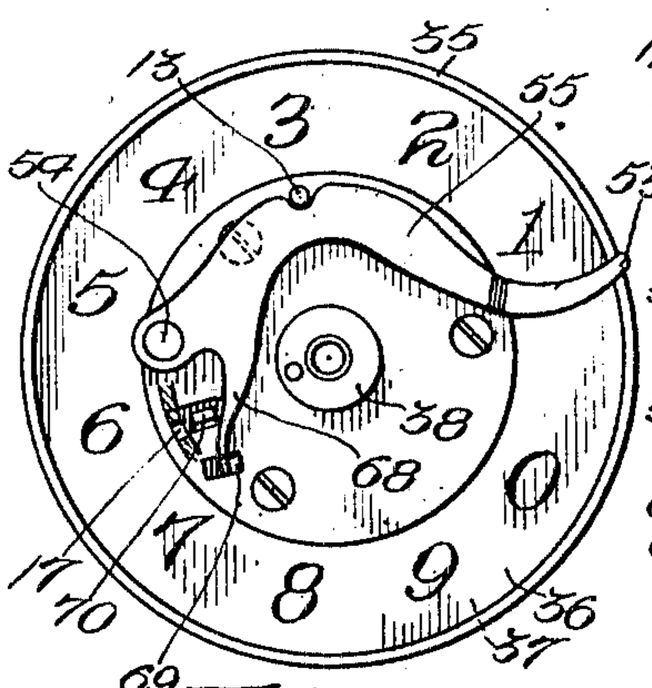

Fig. 13.

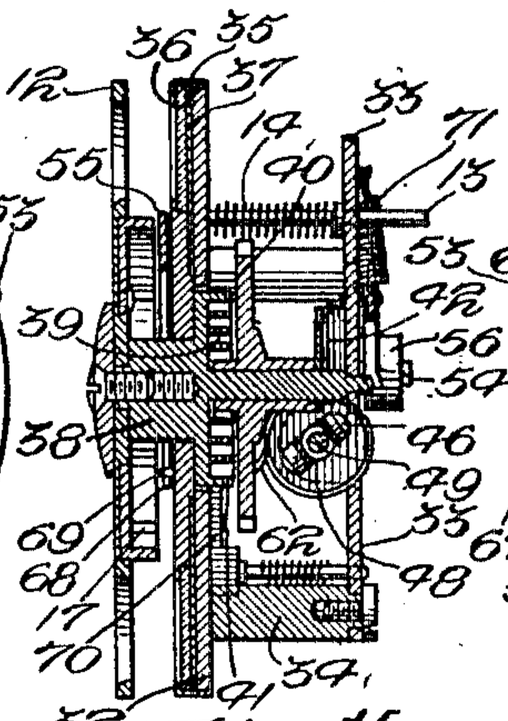

Fig. 15.

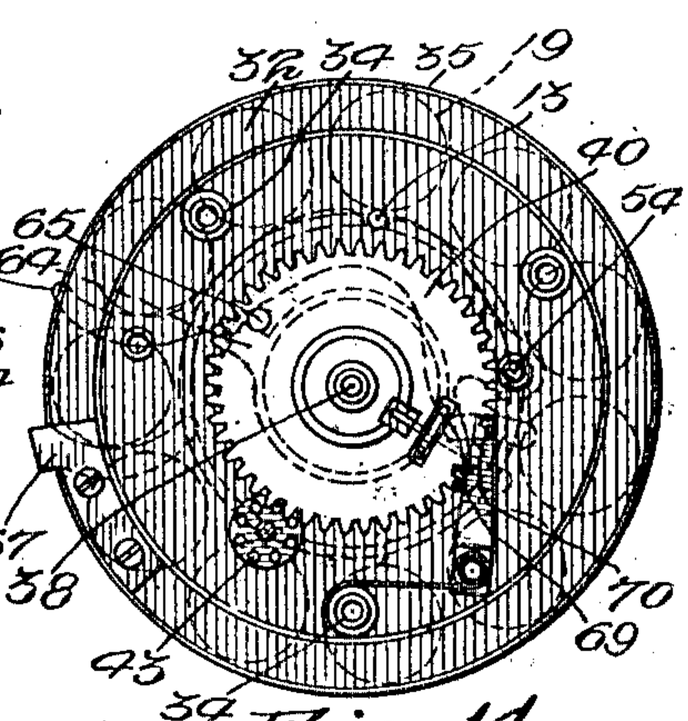

Fig. 14

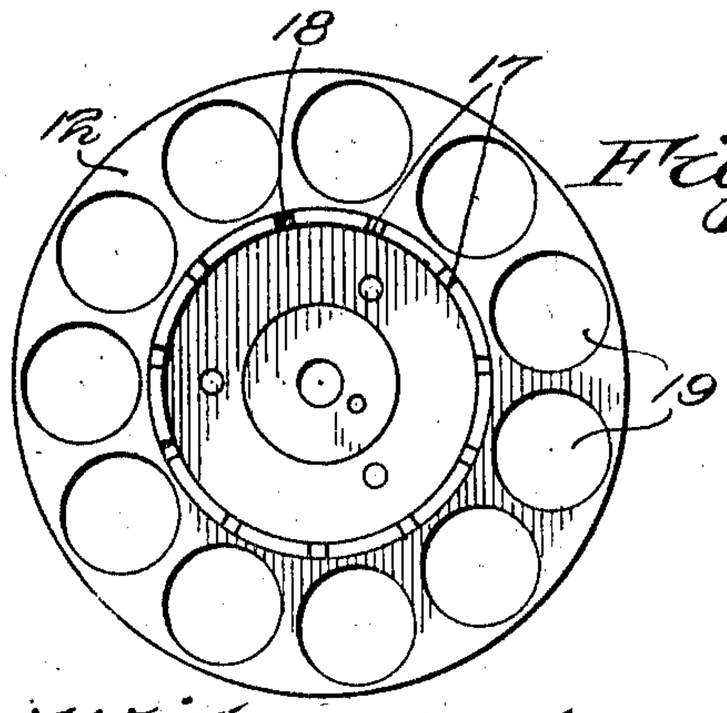

Fig. 16.

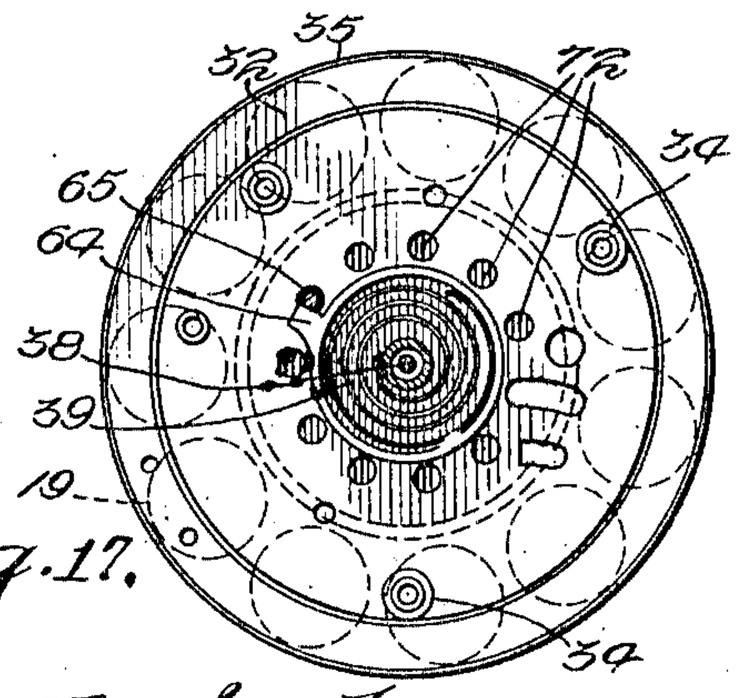

Fig. 17.

Witnesses.

R. H. Burfeind.

A. B. Spring.

Inventor:

John G. Blessing,

By Bulkley Strawn & Drury.

Attorneys.

J. G. BLESSING.

TELEPHONE SYSTEM.

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6 SHEETS—SHEET 5.

Fig. 18.

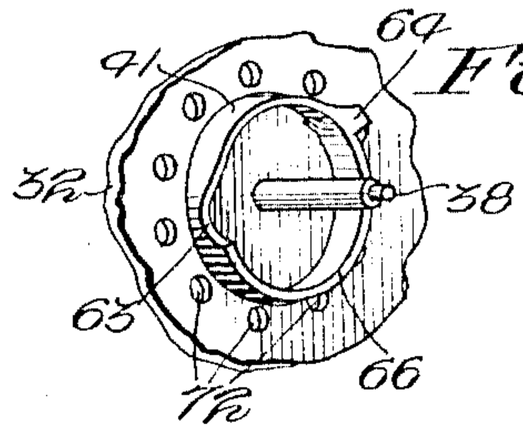


Fig. 19.

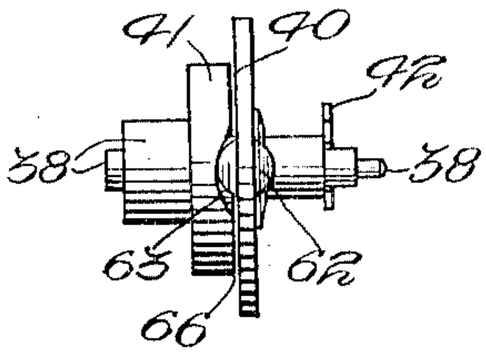


Fig. 20.

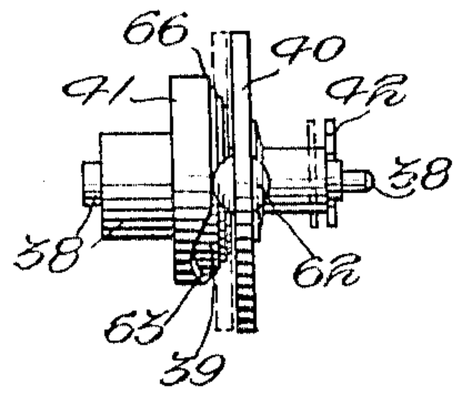


Fig. 21.

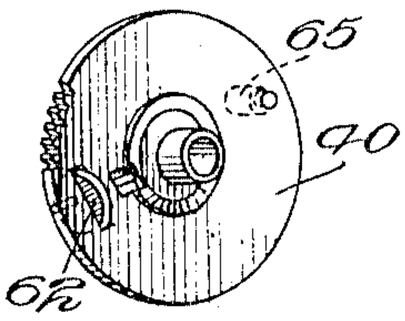


Fig. 22.

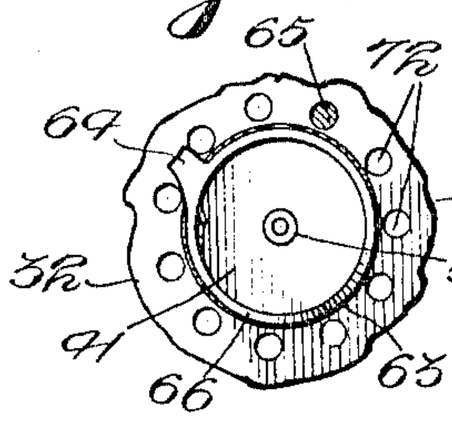


Fig. 23.

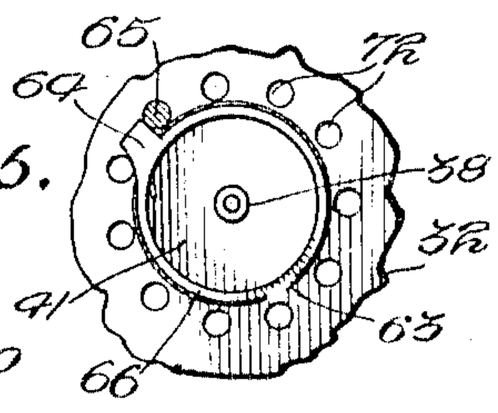


Fig. 24.

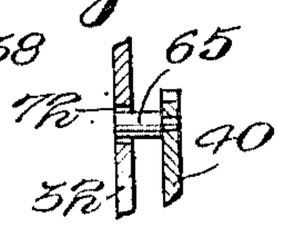


Fig. 25.

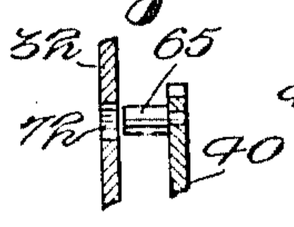


Fig. 26.

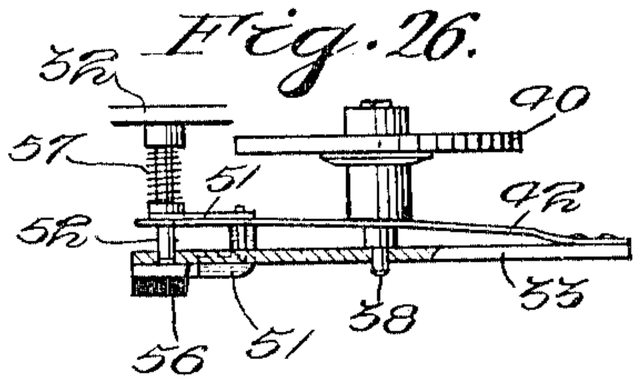


Fig. 27.

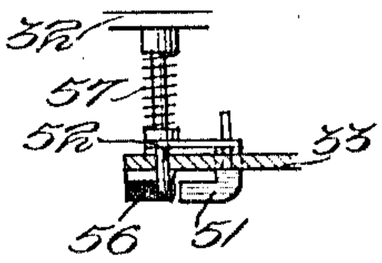


Fig. 28.

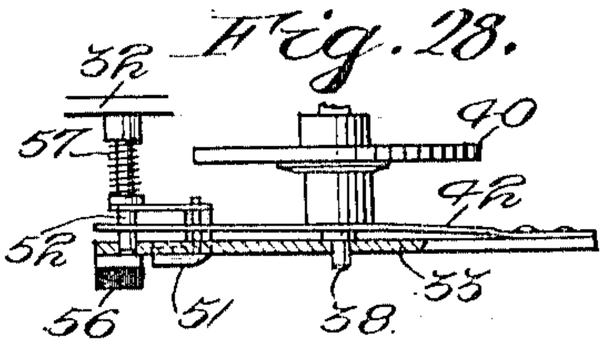


Fig. 29.

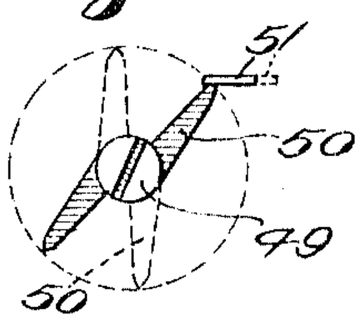
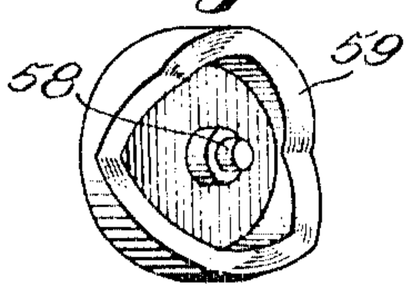


Fig. 30.



Witnesses.
R. H. Burfeind.
A. B. Spencer.

Inventor:
John G. Blessing,
By Bulkley, Braud & Drury,
Attorneys.

J. G. BLESSING.

TELEPHONE SYSTEM.

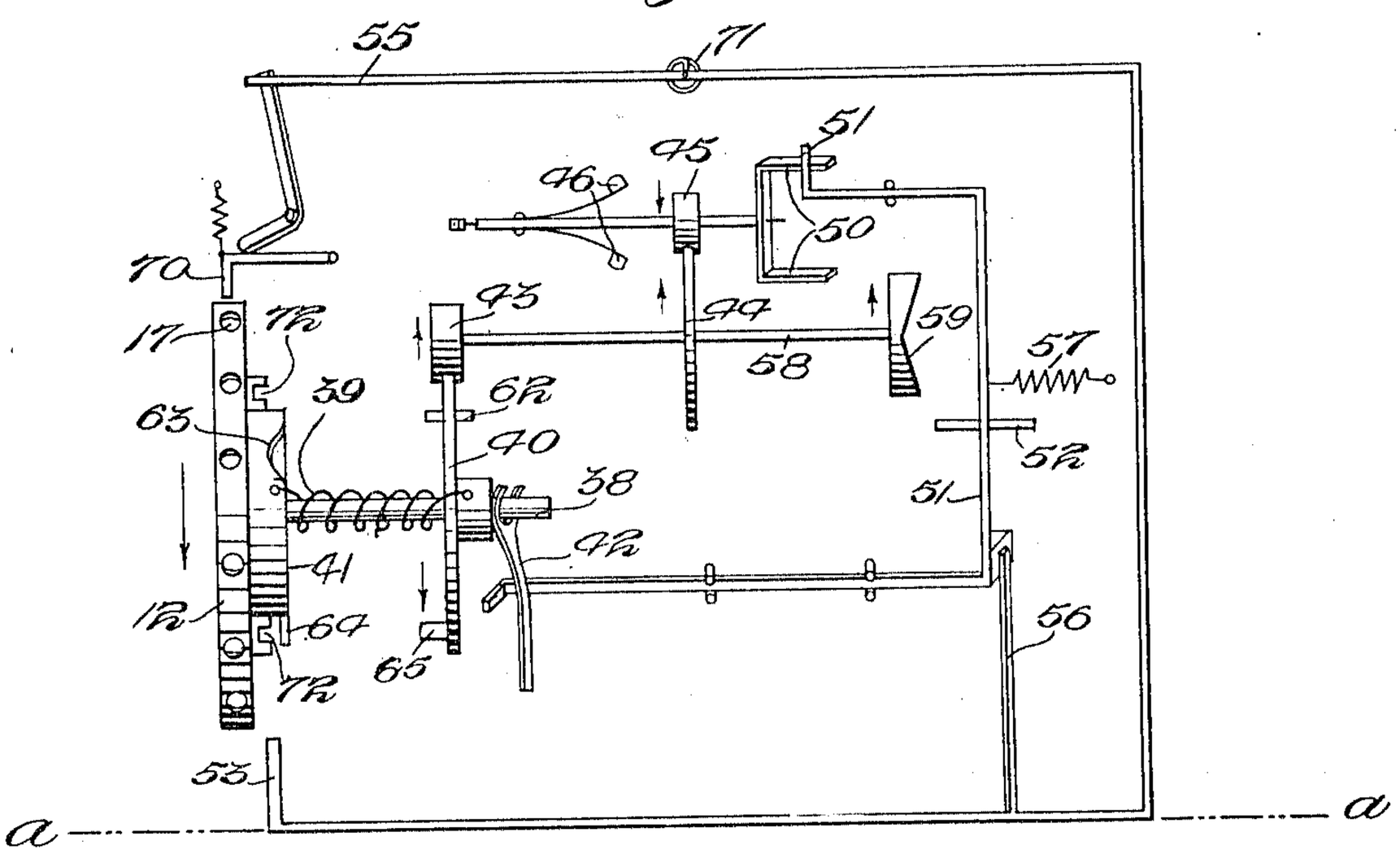
APPLICATION FILED DEC. 21, 1908.

1,119,394.

Patented Dec. 1, 1914.

6 SHEETS—SHEET 6.

Fig. 31.



Witnesses.
P. H. Burgess
A. B. Spurr.

Inventor:
John G. Blessing,
By Bulkley & Durand & Drury.
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN G. BLESSING, OF CHICAGO, ILLINOIS, ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE SYSTEM.

1,119,394. Specification of Letters Patent. Patented Dec. 1, 1914.

Application filed December 21, 1908. Serial No. 468,492.

To all whom it may concern:

Be it known that I, JOHN G. BLESSING, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Telephone Systems, of which the following is a specification.

My invention relates to an improvement in calling devices for automatic or semi-automatic telephone systems, which calling devices are usually located at the subscribers' stations, although often times in semi-automatic systems these devices may be located at the central station, being under the control of an operator.

Objects of my invention are to provide improved means for preventing the subscribers from forcing or accelerating the operation of these calling devices, and for precluding other irregularities in the use of the calling dials, thus insuring, by improved means, a proper transmission of the impulses by which the switches are operated at the exchange or central station; to provide a mechanical connection between the calling device and the switch-hook of the subscriber's telephone, whereby the said device may be located at the base of a desk-set of which the said hook is located at the upper end of the tubular standard thereof, the said hook thereby exercising the desired control, mechanically, of course, over the calling dial, notwithstanding the increased distance between these two elements, as distinguished from the old arrangement in which the hook was disposed at or near the axis of the dial; to provide improved means for retarding the closing of the line circuit when the receiver is removed from the hook, whereby the proper release of the switches in a two-wire system may not be interfered with by a removal of the receiver too quickly after hanging the same upon the hook; to provide an improved arrangement of the gearing of the calling mechanism, whereby the operation of the rotary impulse wheel thereof is more effectively governed than heretofore; and to provide certain details and features of improvement and combinations tending to increase the efficiency of a telephone system of this particular character.

In the accompanying drawings—Figure 1 is a vertical section of a subscriber's desk-set or instrument embodying the principles of my invention. Fig. 2 is a detail view showing a section of the switch-hook, and of the connecting link or rod that runs to the switch-hook. Fig. 3 is a detail view of the dash-pot controlled by the rod aforesaid. Fig. 4 is a section on line 4—4 in Fig. 1. Fig. 5 is a section on line 5—5 in Fig. 1. Fig. 6 is a bottom view of Fig. 1, showing the calling device and bottom plate on which are mounted the induction coil, springs and other details. Fig. 7 is a bottom view of the bottom plate of the desk-set. Fig. 8 is a side elevation of the bottom plate. Fig. 9 is a top view of the bottom plate. Fig. 10 is a front elevation of the calling device of the said instrument. Fig. 11 is a side view of the same. Fig. 12 is a rear elevation of the same. Fig. 13 is a view similar to Fig. 10, but showing the dial removed. Fig. 14 is a section on line 14—14 in Fig. 11. Fig. 15 is a section on line 15—15 in Fig. 12. Fig. 16 is a rear elevation of the dial. Fig. 17 is a section on line 17—17 in Fig. 11. Figs. 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 show details of the calling device. Fig. 31 is a diagrammatic representation of the mechanism of the calling device.

Referring to Fig. 1 it will be seen that the appearance of the desk-set or instrument as a whole is very much the same as a manual instrument, with the exception of the calling device on the base, which device is inclined at an angle of about forty-five degrees. The casing of the instrument, it will be seen, consists of a base portion 2 of the usual shape. To this base portion there is secured a tubular upright 3 within which is contained the collar 4, bolts 5 and bushing 6. This bushing is provided with a centrally located threaded section adapted to receive a bolt 7, by means of which bolt the base 2 is secured to the said bushing. The switch-hook 8 is provided with the usual pivot bearing 9 through the medium of which the switch-hook is pivoted in the channel 10 and between the lips of the collar 4. The switch-hook is provided with a pendant rod 11 by means of which the dial 12 of the calling device is locked when the receiver is placed on the switch-hook. This is accomplished as follows: Referring to Figs. 11 and 15 in connection with Fig. 1, the locking pin 13 which is held in normal

position by the coiled spring 14 normally rests in such a position that it registers with one end of the lever 15, the other end of which registers with the pendant rod 11. This lever is pivotally supported upon the upturned flange 16, and is so adjusted that when the rod 11 is depressed, the end of the lever 15 that registers with said rod is depressed, while the other end of the lever which registers with the locking pin 13 is raised. By this arrangement the locking pin is pressed upward toward the dial 12, whereby the end of the locking pin nearest the dial registers with one of the slots 17, as indicated at 18 in Fig. 16. It will be seen that there are as many of these slots 17 as there are finger-holes 19, so that the dial is adapted to be locked in any one of ten positions—that is, in any one of its normal positions. The pendant rod 11 is also adapted to control a dash-pot arrangement. (See Fig. 3). The said dash-pot, it will be seen, is mounted on the bushing 6. It consists of a cylinder 20 and plunger 21 and a retracting spring 22. The plunger 21 has a central bore 23 that connects the air chamber with the valve in the upper section. It will be seen that when the plunger 21 is depressed by the switch-hook through the medium of the flange 24, (Fig. 3), the air rushes up through the bore 23 and raises the ball 25 and passes out through the crevice 26. When the plunger is released, however, the air cannot return by the way it passed out, but must leak in between the plunger and the cylinder walls. Referring to Fig. 3, it will be seen that the piston or plunger of the dash-pot is provided with a depending member 27 which is adapted to work in conjunction with the springs 28, 29 and 30. Therefore, when the switch-hook is depressed the spring 29, which is held in engagement with the spring 28 while the receiver is off the hook, may be quickly separated from said spring 28 and permitted to pass into engagement with the spring 30, as when the receiver is hung up; but when the receiver is removed from the hook the spring 29 cannot reverse its position as quickly. It will be seen that the plunger 21 has attached to it a separate spring 31, the tension of which may be regulated to control the time of operation of the dash-pot.

The calling device is detachable as a whole from the base 2, there being no electrical connections whatever attached to the calling device. It consists of a frame having a front plate 32 and a back plate 33 suitably held together by ties 34 (Fig. 15). Clamped to the plate 32 by means of a clamping plate 35 there is a glass plate 36 provided with a proper cushion-back of paper or other material 37. The dial 12 is suitably secured to a centrally located shaft 38 which is supported in place between the clamping plate 35 and the back plate 33. Attached to the shaft 38 there is a coiled spring 39, the other end of which is attached to the gear wheel 40 (see Fig. 17) which is loosely mounted upon the rear section of the shaft 38. This gear wheel 40 is normally kept against the cup 41 (Fig. 18) that contains the spring 39 by a suitable spring 42. This spring and its relation to the gear wheel 40 is more clearly shown in Figs. 19, 26 and 28. The gear wheel 40 engages a pinion 43 (see Figs. 11 and 14), to which pinion there is attached a gear 44. This gear in turn meshes with a worm gear 45 to which a governor 46 is attached. This governor is of a centrifugal character, the ends of the limbs 47 (Fig. 12) of which are weighted and swing off until they strike and run against the inner surface of the cylinder 48 (Fig. 15). Evidently, therefore, the speed at which the gear wheel 40 (Figs. 19, 20, 26 and 38) can rotate may be controlled by such governor. At the end of the shaft 49 that carries the worm 45 (Figs. 12, 15 and 29), and opposite the governor end, there is pivoted a two-toothed pinion 50 through the medium of which the governor is normally locked. The locking member 51 (Figs. 26, 27, 28 and 29) is loosely mounted upon a pin 52 (see Fig. 15) which is held in position between the front and back plates 32 and 33 of the frame. This locking member 51 is prevented from rotating on this pin by a short guide pin (not shown) that projects forwardly from the back plate 33. It will be seen that the same spring that holds the gear wheel 40 in its normal position, as shown in Fig. 19, retains the locking member 51 in a position to hold one of the teeth of the pinion 50, as shown in Fig. 29. This locking member 51, as indicated in Figs. 26 and 27, is adapted to slide back and forth on the pin 52. While in the position indicated in Fig. 26, the locking member 51 assumes the locking position shown by the solid lines; but when it assumes the position shown in Fig. 27, the locking member slides to the position indicated by the dotted lines in Fig. 29 and permits the governor and, therefore, the gear wheel to operate. It will be seen that whether or not the governor and gear wheel may rotate depends upon the position of the spring 42 (see Figs. 26 and 27), and it also depends upon the position of the trigger 53. Referring more particularly to Figs. 12 and 13, this trigger consists in detail of a shaft 54 at the front end of which there is attached the member 55, and at the rear end of which there is attached the member 56. Due to the control of the trigger 53 the spring 42 may be removed from the locking member 51, as indicated in Fig. 28, but still the locking member 51 will be unable to assume the position

shown in Fig. 27 for locking the governor, as indicated in Fig. 29, due to the position of the trigger arm 56. This position is indicated in Figs. 11 and 12 which corresponds with the position indicated in Figs. 26 and 28. When, however, the finger of the calling subscriber presses the trigger 53 sufficiently to lower the arm 56 (Fig. 12) and permit the coiled spring 57 to drive out the locking member 51, as indicated in Fig. 27, then and at the instant that the locking member 51 clears the tip of the governor the main spring 39 acts to rotate the gear wheel 40, which in turn rotates the pinion 43 on the shaft 58 on which is located the gear 44 which in turn drives the governor.

It will be seen that on the shaft 58 (Fig. 11) there is provided a device 59 for operating the impulse springs 60 and 61. These springs 60 and 61 are indicated in Figs. 7, 8 and 9, and at the called subscriber's station. This cam-like device 59 that controls the impulse springs is more clearly shown in Fig. 30. It will be seen that the gear wheel 40 (Figs. 19, 20 and 21) is provided with an anti-friction roller 62 for preventing friction between the edge of the spring cup 41 and the gear wheel 40. This anti-friction wheel 62 normally rests within a carved-out section 63 (Fig. 19). It will also be seen that on the sides of the spring cup and diametrically opposite this carved-out section there is a stop-lug 64 (Figs. 18 and 22) against which the pin 65 on the gear wheel 40 normally rests, as indicated in Fig. 23. When the subscriber turns the dial he rotates the spring cup 41 which is rigidly secured to the dial; and since the governor is normally locked, as indicated in Fig. 29, the gear wheel 40 cannot turn, and consequently the roller 62 is forced from the depression or carved-out section 63 to the rim 66 of the spring cup, as indicated in Fig. 20, with the result that both the gear wheel 40 and spring 42 are depressed, as indicated in Fig. 20. As the dial continues to rotate, the tension in the cup spring 39 is increased until the finger trips the trigger 53. By the time that the finger reaches the finger stop 67 (Fig. 10) the trigger 53 has been sufficiently pressed to permit the rear arm 56 to clear the pin or shaft on which the governor locking member 51 is mounted.

By referring to Fig. 13, it will be seen that normally the tail-stock 68 on the front arm 55 of the trigger retains the end 69 of the spring-controlled locking device, one end of which is shown at 70. This device, having ends 69 and 70, is controlled by a retracting spring which, like the spring 14 shown in Fig. 11, is adapted to engage one of the slots 17 (see Figs. 13 and 16) on the dial, whereby the dial is prevented from turning as long as the gear wheel 40 is turning. Even if the subscriber should remove his finger from the trigger 53 before the mechanism comprising the train of gears has stopped rotating, still the trigger 53 cannot return to normal position, because the pin or shaft 52 drops behind the arm 56 of the trigger, as indicated in Fig. 27, and prevents the arm 56 from raising to the normal position shown in Fig. 12. It follows, therefore, that as long as the mechanism is operating, the dial remains locked through the medium of the locking mechanism shown in Fig. 13 which comprises the member provided with the terminals 70 and 69. As soon as the mechanism releases the stopping pin, however, the trigger is released and the dial is unlocked, but the governor is locked. This operation is accomplished in the following manner: The dial having been rotated, and operating tension having been set up in the cup spring 39, then as soon as the governor is unlocked the gear wheel 40 starts to rotate in the same direction that the dial has been previously rotated until the anti-friction wheel 62 again finds the depression 63 into which the spring 42 forces the said wheel, as shown in Fig. 19. At the same time the spring 42, it will be seen, restores the governor locking mechanism, as indicated in Fig. 26, thereby withdrawing the pin 52 from behind the arm 56 of the trigger, with the result that the retracting spring 71 then restores the trigger to its normal position. It should be explained that shortly after the anti-friction wheel 62 registers with the depression 63, the stop 65 of the gear wheel 40 meets the stop-lock 64 on the spring cup, which thereby insures that the pin 65 registers with one of the holes 72 into which it is forced by the spring 42 at the same time that the anti-friction wheel 62 enters the depression 63. It will, of course, be evident that it is impossible for the pin 65 to enter one of the holes 72 before it nears the lug 64, as, for example, in the position indicated in Fig. 22, on account of the anti-friction wheel 62. The engaged and disengaged positions of the pin 65 and the holes 72 are indicated in Figs. 24 and 25, respectively. Although in the drawings the holes 72 are larger than the pin 65, it is not necessary that they should be any larger than to just admit the pin 65. It will at once be seen that this is true because the actual stopping is done at the governor. The principal use of the pin 65 is to stop the dial if it should be released before the trigger is pressed.

From the foregoing it will be seen that when the subscriber rotates the dial in a clockwise direction (Fig. 10) he winds up the main spring 39, and at the same time presses the gear wheel 40 away from the dial. This gear wheel 40 in turn presses the spring 42 away from the governor-locking

device, leaving the said locking device under the control of the arm 56 of the trigger 53. As the finger reaches the finger stop 67 the trigger 53 is depressed, with the result that the arm 56 clears the governor-locking device 51, leaving said device to the control of the retracting spring 57, which spring withdraws the locking device from the governor, thus permitting the train of gears to operate. At the same time that the governor is unlocked the trigger operates to lock the dial 12 (Fig. 31) by advancing the finger 70 of the dial-locking device into one of the slots 17 in the dial. The power for operating the train of gears, as already explained, is provided by the main spring 39 which, since the dial 12 is rendered immovable at the same time the governor is unlocked, forces the gear wheel 40 to rotate. This gear wheel in turn rotates the shaft 58 on which are fastened the gear 44 and the impulse spring cam 59. As this cam 59 rotates it operates the impulse springs which control the switches at the central office. The gear wheel 44, of course, being in engagement with the worm gear 45, rotates the governor. As soon as the governor begins to rotate, the gear wheel 40 begins to rotate also and continues to do so until the anti-friction wheel 62 finds the depression 63. By the time the wheel 62 finds the depression the stop pin 65 strikes the stop lug 64, and at the same time the gear wheel 40 is pressed into normal position, as shown in Fig. 19, with the pin 65 in one of the holes 72, as shown in Fig. 23, thereby bringing the whole train to a standstill. It is evident that as the wheel 40 drops into normal position the spring 42 draws the locking member 51 into position, locking the governor and unlocking the arm 56 of the trigger, at which instant the spring 71 restores the trigger, the member 55 of which then permits the dial-locking pin 70 to be drawn out of engagement with the dial, thus unlocking said dial.

It will be seen that the above description applies to Fig. 31, and taken in conjunction with this figure gives a clearer understanding of the workings of the calling device. In connection with this figure it may be well to explain that the trigger, to which in this figure are attached the arms 55 and 56, oscillates about an axis indicated by a line *a*—*a*. By referring to this figure it will be seen that when the spring 42 is forced to the right by the gear wheel 40 when the dial is rotated, the governor-locking device 51 is prevented from operating (in response to the tension of the spring 57) by the arm 56 on the trigger 53; but when the trigger is depressed the arm 56 is pressed down, thus permitting the spring 57 to act upon the locking device 51, which in turn locks the arm 56 and, therefore, the trigger as a whole until the gear wheel 40 jumps back into normal position, at which time the spring 42 restores the locking member 51 and releases the trigger. When the calling device is in position on the base of the subscriber's instrument, as indicated in Figs. 1 and 6, the cam 59 is brought into such a position that the rotation of said cam operates the impulse spring 61. It will be seen that at each revolution of the cam 59 the spring 61 is separated from the spring 60 twice. This particular construction, however, is not essential, as the cam may be made to separate the spring only once at each revolution, or more than twice during each revolution. It will be seen, furthermore, by referring to Fig. 15 that the pin 13 which is controlled by the switch-hook (Fig. 1) through the medium of the rod 11 is adapted to engage the same slots 17 on the dial that are engaged by the dial-locking terminal 70 (Fig. 13). Within the base of the frame the plate 73 is suitably fastened to the member 7 by a nut 74. On this plate are mounted the binding posts 75, induction-coils, springs and other details necessary for completing and controlling the circuits at the subscriber's station. Beneath this plate there is provided a guard 76 which is also properly secured, as, for example, to the nut 74 by a screw 77. A suitably insulated opening 78 is also provided for a terminating cable that is made up of conductors that connect with the line and other circuits.

From the foregoing it will be seen that I provide an improved arrangement whereby the calling device is located at the base of a telephone desk-set, and whereby the switch-hook at the upper end of the standard of the set is mechanically connected with the said calling device, whereby the requisite control is exercised by said hook over said device. It will also be seen that I provide means for retarding the transition of the line from normal to operative condition—that is to say, when the subscriber takes down his receiver the line does not change instantly from its normal condition to a condition suitable for the transmission of voice-currents. In this way the subscriber or calling party is precluded from hanging up his receiver and then instantly taking the same down again and thereby interfering with the release of the switches. The switches at the central station, some of which have one motion to select groups and another motion to connect with a line in any selected group, are releasable by simply opening the line circuit at the substation. For this reason it is desirable that provision be made for insuring against a too quick closing of the line circuit after the same has once been opened for the purpose of releasing. Also, the subscriber or calling party cannot force or manipulate the dial in such manner as to interfere with the proper transmission of

the impulses, inasmuch as the dial can only rotate operatively in one direction; and if released before reaching the limit of its forward motion will fly back without sending any impulses. As soon as the subscriber or calling party moves the trigger 53, which motion is sufficient to automatically release the impulse wheel, the latter then rotates to an extent corresponding to the extent to which the propelling spring has been tensioned for any particular digit of the called number. Thus the dial always rotates first and the impulse wheel afterward; but with my improved arrangement the impulse wheel rotates much faster than the gear wheel that is propelled by the spring, there being a speed-up gearing between the spring and the impulse wheel. This speed-up gearing has a propelling device at one end and a governor at the other end, and the impulse wheel is connected at an intermediate point therein. By applying the stopping device to the governor, which is at a point in the gearing having the highest speed, greater certainty is obtained, as the mechanism is stopped instantly and without danger of being carried beyond the proper point by momentum. Both the mechanical connection between the switch-hook and the dial and the dash-pot or retarding device are located within the standard—that is to say, within the tube which rises from the base upon which the calling device is located. As thus constructed it will be seen that my invention contemplates an improved and highly efficient telephone desk-set of that general type in which the receiver, switch-hook and transmitter are supported at the upper end of a tubular standard which rises from a base or pedestal. It will also be seen, as explained, that by my invention I provide a calling dial that cannot remain in an intermediate position—that is to say, it must be rotated until the finger of the operator reaches the stop 67 in order to enable it to remain in an advanced position. If released before the finger strikes the stop 67 the said dial then flies back to the position from which it was moved, without transmitting any impulses. The impulse-transmitting mechanism is automatically released by pressure of the finger on the trigger 53, and thus the impulse mechanism is automatically set in motion regardless of whether the subscriber lets go of the dial. Obviously the movement of the impulse wheel to transmit the impulses cannot be accelerated or interfered with by the calling party. Thus the proper transmission of the impulses is made more reliable and certain.

What I claim as my invention is:—

1. In a telephone system, a rotary dial, an impulse wheel, separate or non-coincident axes for said dial and wheel, means for causing the wheel to rotate after the dial while the latter remains at rest in its advanced position, a governor, and a train of gearing to the ends of which the dial and governor are applied with the impulse wheel connected at an intermediate point therein.

2. In a telephone system, a dial, an axis for said dial, an impulse wheel provided with an axis, a speed-up gearing from the axis of the dial to the axis of the wheel, and means including a spring whereby the wheel rotates after the dial and while the latter is standing still.

3. In a telephone system, a dial, an impulse wheel, a spring adapted to be tensioned by the forward rotation of the dial, means for holding the dial against return in a backward direction to normal position, a speed-up gearing driven by the spring to operate the said wheel, and means for automatically releasing the wheel when the calling party operates the dial.

4. In a telephone system, a train of gearing, a spring applied to one end of said train to propel the gearing, means for tensioning the spring, an impulse wheel connected at an intermediate point in said train, a governor applied at the other end of said train, and means for automatically releasing the train of gearing each time the spring is tensioned for a digit of the called number.

5. In a telephone system, a subscriber's calling device provided with an impulse wheel in the form of a cup having a continuous but uneven edge serving as a cam, and circuit-controlling means insulated from, engaged and operated by the cam edge of said wheel.

6. In a telephone system, a dial, a gear wheel, a spring for propelling the gear wheel, said spring connected to be wound up by the dial, means for releasing the gear wheel when the dial has been advanced, an impulse wheel, and a gearing through which the gear wheel acts to drive the impulse wheel.

7. In a telephone system, a dial, an impulse wheel, means whereby the advancement of the dial causes the subsequent advancement of the wheel, a governor, and means applied at the governor to automatically release the wheel when the calling party operates the dial.

8. In a telephone system, a base, a standard, a hook-switch at the top of the standard, a calling device on the said base, and a mechanical connection inclosed within the standard, whereby the hook-switch exercises control over the said calling device.

9. In a telephone system, a base, a calling device on the base including a dial, a standard on the base, a switch-hook at the top of the standard, a lock for said dial, and a rod for operating the lock to release the dial

when the receiver is removed from the said hook, said rod disposed vertically within said standard.

10. In a telephone system, a base, a standard on said base, a switch hook at the top of said standard, a pin extending upward through said base, a rod for operating the pin when the receiver is removed from the said hook, said rod disposed vertically within said standard, and an impulse-transmitting device controlled by said pin.

11. In a telephone system, a base, a dial mounted on said base, a dial lock, a standard on said base, a switch hook at the top of said standard, springs in said base, and means extending downwardly in the standard to operate said springs when the hook is raised.

12. In a telephone system, a base, a dial mounted on said base, a dial, lock, a standard on said base, a switch hook at the top of said standard, springs in said base, and a dash-pot for retarding the operation of said springs when the receiver is moved from the hook, said dash-pot inclosed in said standard.

13. In a telephone system, a dial, a dial lock, a switch-hook, a rod by which the hook operates said lock, line springs, a dash-pot connected to operate said springs, means by which the said rod operates the dash-pot only in one direction, and a spring for operating the dash-pot in the opposite direction when the receiver is removed from the hook.

14. In a telephone system, a calling device including an accelerating gear train, an impulse-transmitting device operatively connected thereto at a point between the ends thereof, means for moving said train after the calling device is operated, and means for stopping said train, the stopping force adapted to be applied at the point of maximum motion.

15. In a telephone system, a calling device including an accelerating gear train, an impulse-transmitting device operatively connected thereto at a point between the ends thereof, means for imparting motion to the train, and means for stopping the same comprising a device adapted to be applied at a point in the train at which the motion is greater than at the point to which the impulse-transmitting device is connected.

16. In a telephone system, a calling device including a gear train one end of which is adapted to move at a slower rate than the other, an impulse-transmitting device operated by the train, means for moving said train, and means for stopping the same comprising a brake adapted to be applied at the point of highest motion to insure an instantaneous and exact stopping of the train and the impulse-transmitting device.

17. In a telephone system, a calling device including an accelerating gear train comprising a power wheel at the slow end and a governor at the fast end, an impulse-transmitting device operated by said gear train, means for causing the operation of the gear train to a definite and predetermined extent to correspondingly operate the impulse-transmitting device to a predetermined extent, and means for stopping the train by directly stopping the governor to insure an instantaneous and exact stopping of the impulse-transmitting device.

18. In a telephone system, a calling device including a dial, a power member, an accelerating gear train, impulse-transmitting means operated by said train, said train comprising a power gear and a governor, the power member having one end attached to the power gear and the other end to the dial, locking means for the dial, means for maintaining the train normally locked, whereby the dial may be operated without at the same time moving the train, and whereby tension may be created in the power member for operating the train, means for then unlocking the train, whereby the impulse-transmitting means may be operated, together with means for at the same time locking the dial, means for then stopping the train comprising a lock adapted to be applied directly to the governor to insure an instantaneous and reliable stopping of the train, and means for at the same time unlocking the dial.

19. A telephone system calling mechanism including a governor-locking mechanism, a dial-locking mechanism, and a trigger for controlling said mechanisms in such a manner that when the governor is locked the dial is unlocked, and vice versa, as set forth.

20. A telephone system calling mechanism including a dial-locking mechanism, a governor-locking mechanism, both controlled by a trigger, a dial, and a dial stop, the trigger adapted to be operated by the calling party's finger as it approaches the finger-stop, whereby at the instant that the finger reaches the stop the trigger releases the governor-locking mechanism, and locks and operates the dial mechanism to lock the dial.

21. In a telephone system, a subscriber's calling mechanism provided with a pin and a series of holes coöperating therewith to effect an instantaneous and exact stopping of said mechanism, as set forth.

22. In a telephone system, a subscriber's calling mechanism provided with a rotary dial, means for locking the dial in its advanced position each time it is rotated, and devices operative to cause the dial to return to its last position when released before reaching the end of any forward rotation thereof.

23. In a telephone system, a subscriber's

calling mechanism provided with a rotary dial, a rotary impulse wheel, a stop for variably limiting the forward rotation of the dial, and means including a trigger associated with said stop for automatically releasing the impulse wheel when the dial reaches the limit of any forward rotation thereof, whereby no impulses are transmitted unless the dial is fully rotated.

24. In a telephone system, a subscriber's calling mechanism provided with a rotary dial, suitable devices operative to cause the dial to return to the position from which it was moved when released for reaching the limit of its forward rotation, and an impulse-transmitting device controlled by the dial but inoperative to transmit impulses when the dial is released at an intermediate point in its forward rotation.

25. In a telephone system, a subscriber's calling mechanism comprising a rotary dial, an impulse-transmitting device controlled by the dial, a trigger actuated upon completion of the forward rotation of the dial to automatically start the operation of said impulse-transmitting device, and devices whereby the dial returns to the position from which it was rotated if the trigger is not operated.

26. In a telephone system, a subscriber's calling mechanism comprising a rotary dial, devices operative to return the dial to the position from which it was rotated when released at an intermediate point in any forward rotation thereof, and an impulse-transmitting device operative to transmit impulses each time the dial reaches the limit of its forward rotation, but inoperative to do so when the dial is released before the forward rotation is completed.

27. In a telephone system, a subscriber's calling mechanism comprising an impulse-transmitting device, a train of gearing for operating the same, a pin and a hole adapted to coöperate therewith for insuring an instantaneous and exact stopping of the impulse-transmitting device, a rotary dial, and devices by which the dial flies back to the position from which it was rotated if released before reaching the limit of its forward rotation, said pin and hole thereby also serving to prevent injury to the said gearing when the dial is released before completing its forward rotation.

28. In a telephone system, a subscriber's calling mechanism comprising a rotary dial, an impulse-transmitting device, a train of gearing connecting the said dial with the said device, a stopping device adapted to act on the gearing at the highest point of speed therein, and the pin and holes cooperating therewith to enable the said stopping device to act effectively at the precise moment.

29. The combination with a numbered plate, the forwardly moving finger hold dial, the slotted flange fixed thereto, the locking member, the movable finger lever adapted to be engaged by the finger when in a finger hold, the fixed indicator, said lever when engaged by the finger upon actuation of the dial, controlling said locking member to engage said flange to lock the dial, impulse mechanism operated responsive to said actuation of the dial and finger lever, and means for unlocking said dial after said mechanism has operated.

30. In a calling device, the combination with a revoluble dial having a plurality of operating positions and a series of adjacent finger holds for actuating said dial, coöperative contacts, operating means for said contacts adapted to be adjusted corresponding to movement of said dial to any one of its positions, a finger lever adapted to be actuated by engagement with the finger in a finger hold, a locking member controlled by said finger lever for locking said dial against further actuation when moved to any of its operating positions, means for releasing said operating means from an adjusted position to operate said contacts, and means for unlocking said dial after said contacts have operated.

31. In a telephone system, a dial, an impulse wheel, means whereby the advancement of the dial causes the subsequent advancement of the wheel, a governor and automatic means for directly releasing the governor to permit the operation of the wheel when the calling party operates the dial.

32. In a telephone system, a calling device including an accelerating gear train, an impulse transmitting device operatively connected thereto at a point between the ends thereof, means for moving said train after the calling device is operated and means for stopping said train by applying the stopping force at the point of maximum motion.

Signed by me at Chicago, Cook county, Illinois, this 15th day of December, 1908.

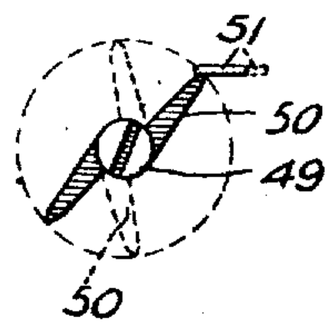
JOHN G. BLESSING.

Witnesses:
EDWARD D. FALES,
J. NORBY.

Correction in Letters Patent No. 1,119,394.

It is hereby certified that in Letters Patent No. 1,119,394, granted December 1, 1914, upon the application of John G. Blessing, of Chicago, Illinois, for an improvement in "Telephone Systems," an error appears in the drawings requiring correction as follows: Sheet 5, Fig. 29, should appear as herein shown,

Fig. 29.



and not as shown in the drawings forming part of the Letters Patent; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of February, A. D., 1915.

[SEAL.]

R. F. WHITEHEAD,
Acting Commissioner of Patents.