

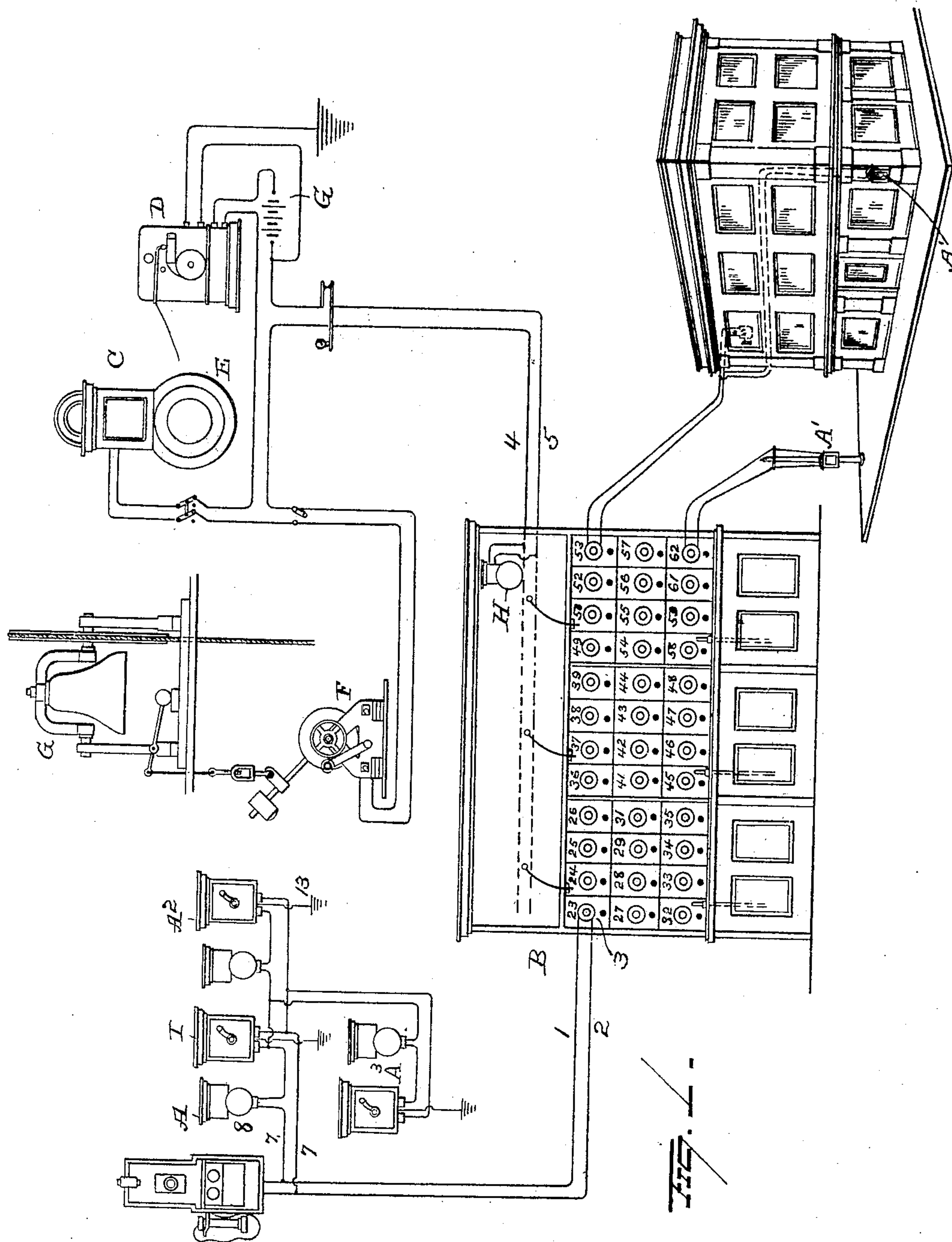
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W. S. & A. S. AUNGST.
ELECTRIC SIGNALING SYSTEM.

APPLICATION FILED MAR. 20, 1905.

2 SHEETS—SHEET 1.



WITNESSES

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G. J. Downing

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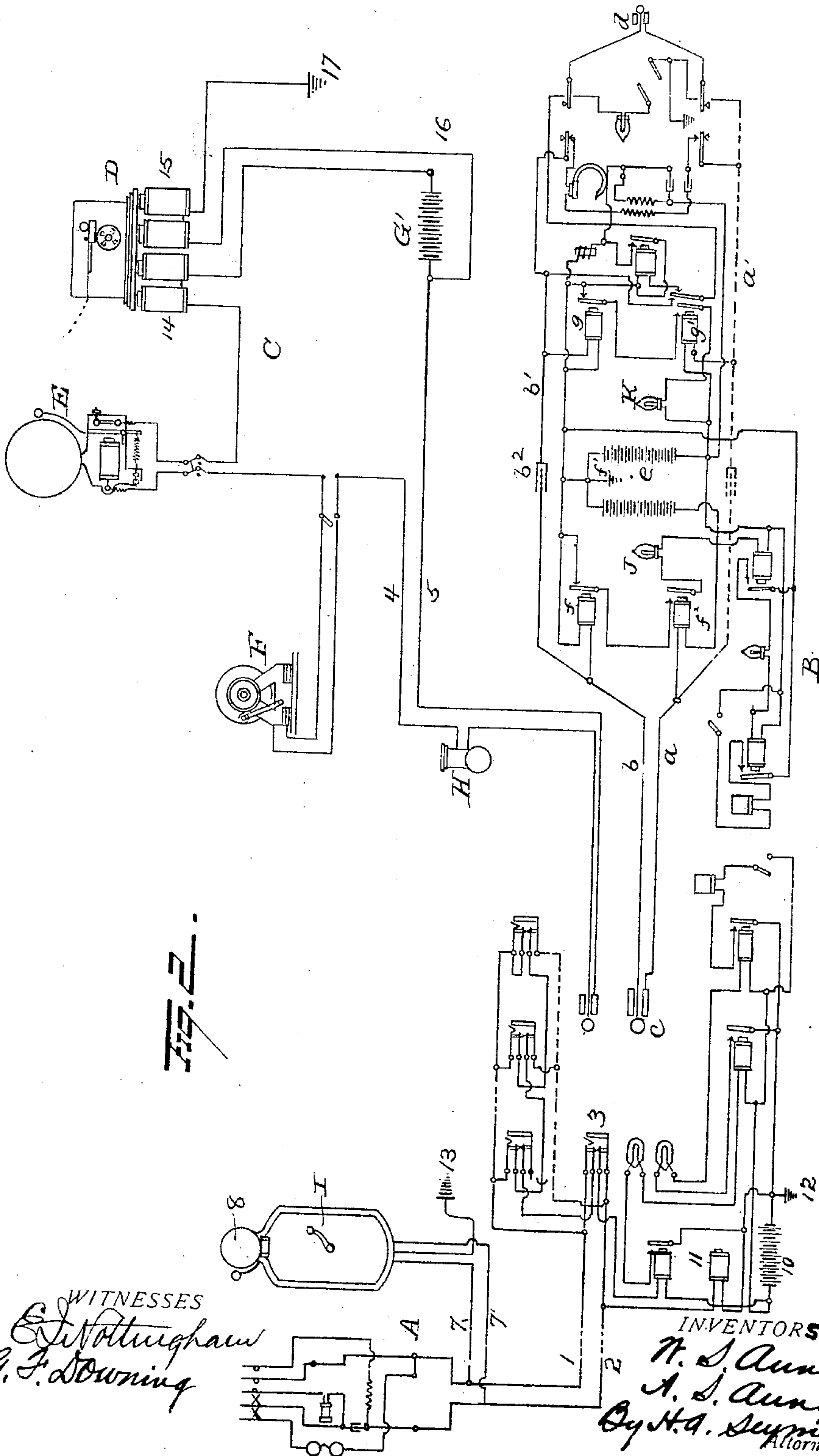
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UNITED STATES PATENT OFFICE.

WILLIAM S. AUNGST AND ARTHUR S. AUNGST, OF ALLIANCE, OHIO; SAID
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ELECTRIC SIGNALING SYSTEM.

No. 805,619.

Specification of Letters Patent.

Patented Nov. 28, 1905.

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To all whom it may concern:

Be it known that we, WILLIAM S. AUNGST and ARTHUR S. AUNGST, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Electric Signaling Systems; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it ap-
10 pertains to make and use the same.

Our invention relates to an improved signaling system, and more particularly to means for transmitting fire, burglar, or other alarms, one object of the invention being to provide
15 simple and efficient means whereby telephone-lines and the central apparatus of a telephone-exchange can be readily and effectually utilized for transmitting such alarms to a fire or other alarm station without necessity for the
20 use of devices at the central office other than those commonly employed in operating the telephone-exchange system except means for connecting a subscriber's line in circuit with a fire or other alarm station.

A further object is to provide means for utilizing telephone subscribers' lines and central-office apparatus for transmitting alarm-signals without including in the signaling-circuit any part of the local telephone-circuit.

A further object is to utilize a telephone subscriber's line and central-office apparatus for transmitting alarm-signals from any one of a number of signal-transmitting devices connected with the same subscriber's line.

A further object is to combine with a subscriber's line an alarm-station and a telephone-exchange central office, means whereby the central-office operator can be apprised of an alarm-call as distinguished from the usual
40 telephone-call, and means whereby the operator can connect the circuit of the alarm-station with the circuit of the subscriber's line and permit the alarm-signal to be transmitted from the subscriber's line or subscriber's station to the alarm-station.

A further object is to adapt signaling means to a telephone system and a fire or other alarm station in such manner that a fire or other alarm can be transmitted from the subscriber's
50 station through the central office to the fire or other alarm station and so that the subscriber and the central-office operator will be notified whether or not an alarm-signal has

been properly received at the fire or other alarm station.

A further object is to utilize a telephone central-office apparatus and a two-wire subscriber's line for transmitting a fire or other signal through the central office to a fire or other alarm station and to provide means
60 whereby the central office would properly receive an alarm-signal, and so that said signal could be properly transmitted from the subscriber's line-station to the fire or other alarm station, even when one of the wires of the
65 metallic subscriber's line-circuit is broken, or when the subscriber's line-circuit is closed by the hook-switch, (when the hand-phone has been removed,) or when the subscriber's line is short-circuited or "bridged," or one wire
70 of the metallic circuit becomes grounded at a point between the subscriber's station and the central office.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangement, as hereinafter set forth, and pointed out in the claim.

In the accompanying drawings, Figure 1 is a general diagrammatical view illustrating the
80 application of our improvements. Fig. 2 is a diagrammatical view illustrating the details of the circuits.

A represents a subscriber's station.

The central office of the telephone-exchange
85 is represented at B, and a fire-alarm station is shown at C.

At 1 2 is represented a two-wire subscriber's line or metallic circuit between subscriber's station A and the switchboard-jack 3 at the
90 central office B. The wires 4 5 of a metallic circuit connected with the apparatus at the fire-station also enter the central-office switchboard, and these wires are adapted to be connected with the wires 1 2 of the subscriber's
95 line by means of a plug inserted into the jack 3. When the subscriber's line and the fire-alarm line have been thus connected, a metallic circuit will have been established between the subscriber's station A through the
100 central office B to the fire-alarm station C, and at the latter station the circuit will include in series a register D, a bell E, an operating device F for a tower-bell G, and a battery G', and said circuit will also include
105 at the central office a small tapper-bell H. At

the subscriber's station a make-and-break device I, of any preferred form of construction, is looped onto the subscriber's line 1 2, as at 7, and this loop-circuit 7 also includes a small 5 taper-bell 8.

With the arrangement of circuits and devices above described when the make-and-break box I is operated the pilot-lamp at the central office (the circuits of which will be 10 hereinafter more fully described) will flash the call of the particular box operated and indicate to the operator that a fire-call is coming in on the subscriber's line. The operator will at once plug-in the fire-station line 4 5. 15 The call-box make-and-break devices will be arranged to repeat the call several times, so that after the subscriber's line has been connected with the line to the fire-alarm station the call will be received on the register D at 20 the latter station, and it will be also received on the bells E and G. If the lines are in proper working order, so as to permit the proper operation of the register at the fire-alarm station when the box I at the subscriber's station A has been "pulled," the fact 25 that the alarm has been properly received at the fire-alarm station will be indicated to the central-office operator by the tapping of the call on the bell H.

30 It is obvious that the alarm call-box need not be located in close proximity to the telephone apparatus at the subscriber's station, but may be located in a different part of the building or even on the outside thereof, as 35 indicated at A', Fig. 1. In fact, several alarm call-boxes might be located in various places at the subscriber's station, one box being looped on the loop-circuit of another box, as shown diagrammatically at A² A³, Fig. 1.

40 It will be clear to any one skilled in the art how the operator is notified of a fire-call by the flashing of the pilot-lamp at the central office when an alarm call-box I is operated without a detailed description herein of the 45 central-office circuits, assuming that when the box I is operated the subscriber's line is open (with the hand-phone on the hook) and the wires 1 2 of the subscriber's line are not crossed or one of them broken. In view of the fact, 50 however, that we provide means to insure the proper transmission of the fire-signal, if the hand-phone is off the hook and the subscriber's line thus closed when the box I is operated, or if at such time the wires 1 2 are crossed or 55 one of them is broken, it becomes necessary to explain the relation of the central-office apparatus to the subscriber's and fire-alarm station lines under such abnormal conditions, although the central-office apparatus and cir- 60 cuits are not in themselves new.

In the system to which we have shown our improvements adapted the cord-circuit comprises in general the limb $a a'$, divided by a condenser a^2 , the limb $b b'$, divided by a con- 65 denser b^2 , a listening-plug c at one end of the

two limbs, and a calling-plug d at the other end. A battery is represented at e , and one terminal of this battery is connected, through the magnet of a relay f , with the limb b of the cord. Another terminal of this battery is 70 grounded at f' and also connected, through the magnet of a relay f^2 , with the limb a of the cord. The contacts of the relays $f f^2$ are included in a circuit with the battery e , which circuit also includes a supervisor's lamp J. Other relays 75 $g g'$ are similarly connected in circuit with the battery f' , limbs $a' b'$ of the cord at the calling side of the condensers $a^2 b^2$, and in the circuit of the contacts of the relays $g g'$ and the battery f' another supervisor's lamp K is included. It 80 will be readily understood that when the plugs c and d (or either of them) are out of jacks the circuits of the relays and the circuits which they control will be open. As shown in Fig. 85 2, the contacts of the relays f and g are normally closed and the contacts of the relays f^2 and g' are normally open. Thus the circuits of the supervisors' lamps J and K are normally open and said lamps are dark. This is 90 also true when either plug is inserted into a jack and the subscriber's line connected with said jack is closed, as by the removal of a hand-phone from the switch-hook at the subscriber's station, because under such condi- 95 tions the magnets of both relays ($f f^2$ or $g g'$) would be energized, causing the contacts of one to open and the contacts of the other to close, and thus cause the circuit of the supervisor's lamp to remain open and the lamp to remain dark. When, however, the subscriber's 100 line is opened (as by the placing of the hand-phone on the hook) while the plug—say, the listening-plug c —is in the jack, the magnet of relay f will become deenergized and permit its contacts to close. The contacts of the relay f^2 105 will remain closed, because the circuit of the magnet of this relay will be closed through the jack, said circuit being traced from the grounded terminal of battery f' through the magnet of relay f^2 , limb a of the cord, the jack, retar- 110 dation-coil 11, to ground 12. Thus the supervisor's lamp J will become luminous when the subscriber's line is opened. The same conditions would exist with respect to the supervisor's lamp J, plug d , and the sub- 115 scriber's line with which it might be connected. These conditions we desire to utilize to insure the operation of our alarm-signaling devices when the hand-phone at the subscriber's station is off the hook and the 120 subscriber's line is thus closed or when the subscriber's line is short-circuited or crossed at same point between the substation and the central office or when one of the subscriber's line-wires is broken or grounded. 125

It is apparent that the pilot-lamp which is used to flash the fire-alarm signal at the central office when the subscriber's line is in normal condition could not be thus employed when the subscriber's line is in use or when the abnor- 130

mal conditions above mentioned exist, because at such time the pilot-lamp would be cut out, and therefore dark. Under said conditions, however, the supervisor's lamp can be utilized to flash the alarm-signal, and the manner in which we accomplish this we will proceed to explain.

One member of the make-and-break device of the call-box I at the substation is provided with a ground connection 13. At the fire-alarm station we prefer to employ a register having two markers actuated, respectively, by magnets 14 and 15. The magnet 14 is included in series with the line 4 5, and the magnet 15 is arranged in a branch circuit 16, which includes also the battery G' and is grounded at 17.

Now let it be assumed that the plug *c* is in the jack and that the subscriber's line is in use, with the hand-phone at the substation off the hook and the subscriber's line therefore closed. Should the call-box I now be operated, the supervisor's lamp J would be caused to flash the signal, and the operator, seeing the alarm-signal thus produced, would withdraw the plug *c* from the jack and plug in the fire-alarm station-line, so that the signal could be transmitted to the latter. The flashing of the supervisor's lamp with the circuit conditions as above outlined may be explained as follows: Before the call-box I was operated the circuit of the lamp J was open at relay *f* and closed at *f*². Now when the circuit is closed by the make-and-break device at the call-box I the circuit of said lamp J will be opened at the contacts of relay *f*, because the circuit which the magnet of said relay forms a part will include the central-office battery, the limb of the party-line, and be grounded at the central office and at the substation. At the same time the contacts of the relay *f*² will remain closed, as the circuit of the magnet of this relay is closed through the jack, the retarder 11, and the ground 12. Now as the make-and-break wheel in box I continues its rotation and opens the circuit including the magnet of relay *f* the contacts of said relay will close, thus closing the circuit of the supervisor's lamp J and causing said lamp to become lighted. As the make-and-break wheel in box I continues its rotation it will close and then open the circuit including the magnet of relay *f*, and thus cause the circuit of lamp J to be alternately opened and closed and the lamp to flash the signal transmitted by the make-and-break mechanism in the box I. The same results would be attained if the calling-plug *d* were used, except that the relays *g g'* instead of the relays *f f*² would be used. As before stated, when a fire-signal is received on the supervisor's lamp the operator will remove the plug *c* or *d* and at once plug-in the line of the fire-alarm station. The subscriber's line being closed at the hand-phone switch, two

circuits will be established through the register at the fire-alarm station. One of these circuits will include in a metallic circuit, with the line-wires 1 2 4 5 and battery G', the magnet 14 and maintain the marker controlled by this magnet in contact with the tape passing through the register, and thus cause a continuous mark to be made thereon. The other circuit will include the magnet 15 of the register, one side of the line-circuit, and the make-and-break device in call-box I, this circuit being grounded at both ends—viz., at 13 and at 17. The marker, actuated by the magnet 15, will therefore be brought intermittently in contact with the tape while the circuit is being interrupted by the make-and-break mechanism of box I, and the signal of box I will thus be recorded in the register at the alarm-station.

The operations above described will also take place if the party-line, instead of being closed at the hand-phone hook, is short circuited at any part of the line between the central and sub station. It will also be observed that the signal can be transmitted from the box I to the fire-alarm station if one or both of the line-wires 2 5 be broken. It will further be observed that on account of the ground connection 13 at the substation the pilot-lamp at the central office would be flashed by the operation of the box I if subscriber's line-wire 2 is broken, because the battery 10 at the central office is grounded at 12.

With the use of my improvements a fire-signal can be transmitted even though the lines 2 or 5 may be broken, but not when both limbs of the subscriber's line or both limbs of the fire-alarm station are down. In the former case the sender of the alarm would know that the alarm has not been received by the central office, because the tapper 8 would not operate, and in the other case the central-office operator would know that the fire-alarm station had not received the signal, because the tapper H at the central office would refuse to respond.

It is apparent that provision may be made for sending a police or burglar call, instead of or in addition to a fire-call, by providing distinctive signals for each of these calls.

Various changes might be made in the details of construction and arrangements of parts of our invention without departing from the spirit thereof or limiting its scope, and hence we do not wish to limit ourselves to the precise details herein set forth.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

The combination of a telephone central-office jack, a subscriber's line connected therewith, an alarm-station register having two markers, a circuit from said register to the central office, a plug in said circuit at the central office, a battery at the alarm-station

and included in the line-circuit with one of
the magnets of the register, a grounded cir-
cuit including said battery and the other mag-
net of the register, a make-and-break call
5 mechanism independent of the local telephone-
circuits looped on the subscriber's line, and a
ground connection for said make-and-break
call mechanism.

In testimony whereof we have signed this
specification in the presence of two subscrib- 10
ing witnesses.

WILLIAM S. AUNGST
ARTHUR S. AUNGST.

Witnesses:

CHAS. O. SILVER,
O. E. PFOUTS.