

No. 752,710.

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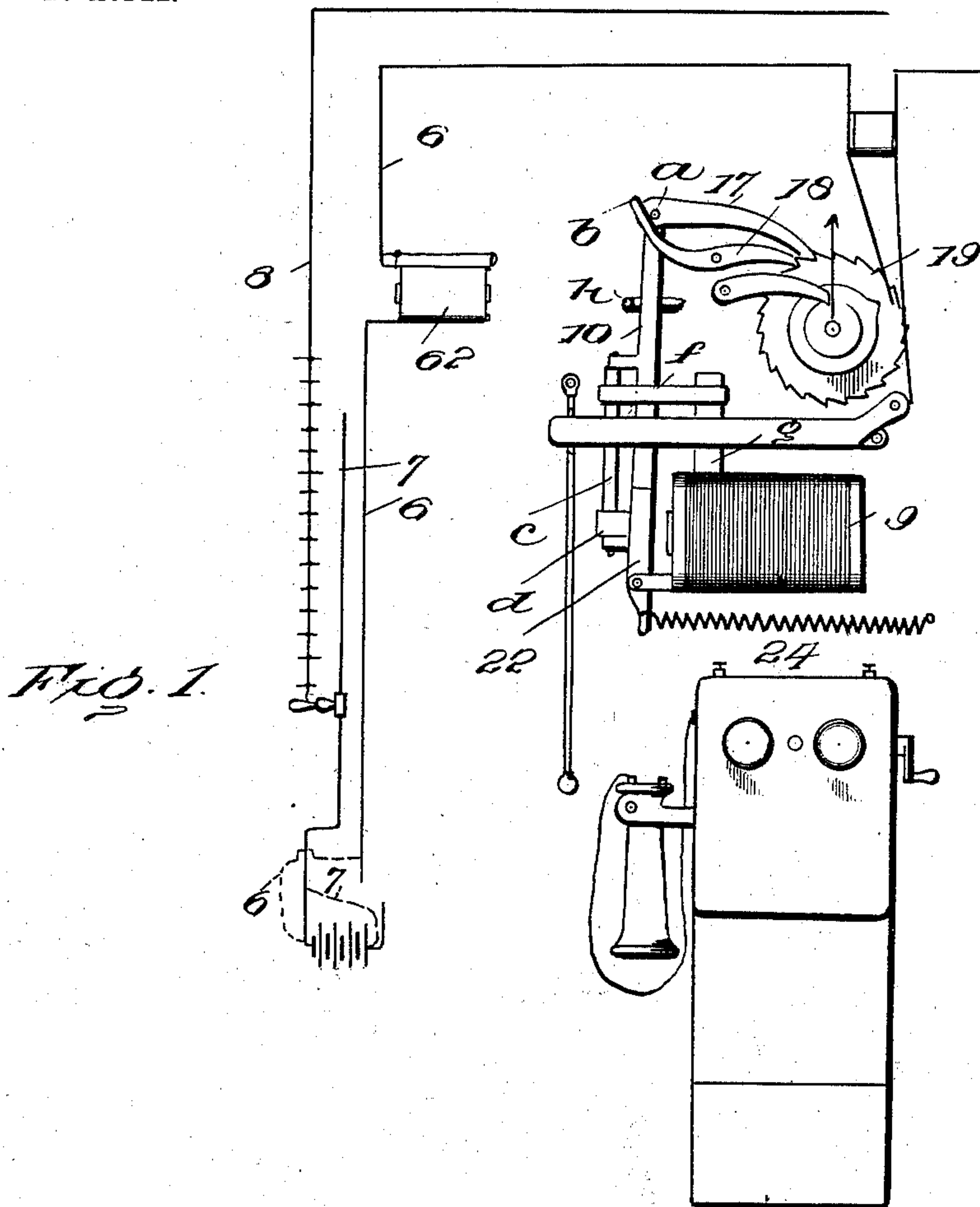
H. REDMON, R. L. HALL & R. H. CONWAY.

MEANS FOR SYNCHRONIZING THE INSTRUMENTS OF TELEPHONE SYSTEMS.

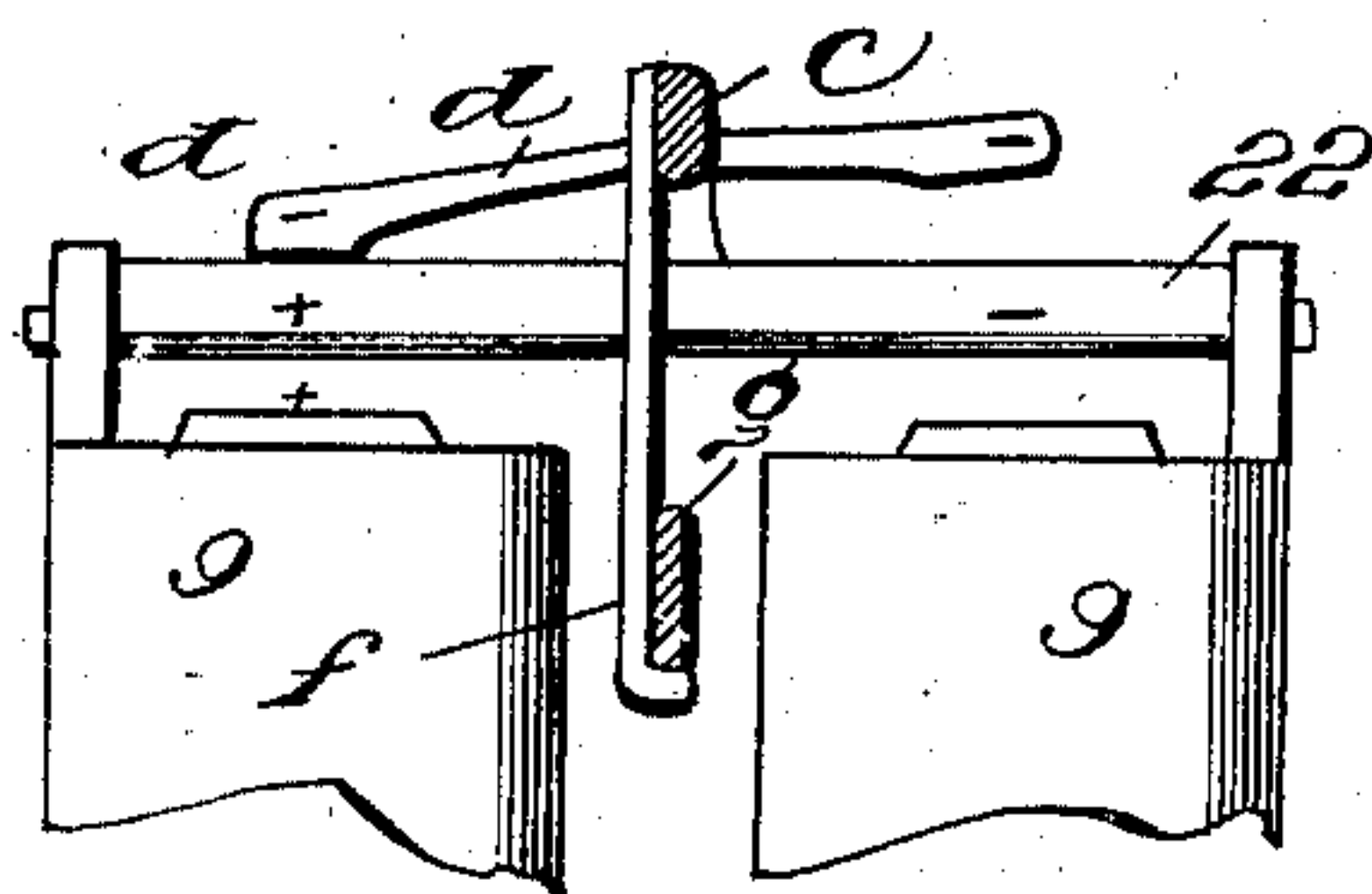
APPLICATION FILED SEPT. 17, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



*Fig. 2*



Witnesses

*W. L. Mumme*  
*W. A. Anderson*

Inventors

*H. Redmon*  
*R. L. Hall*  
*R. H. Conway*

By

*R. M. Racy*, Attorneys.

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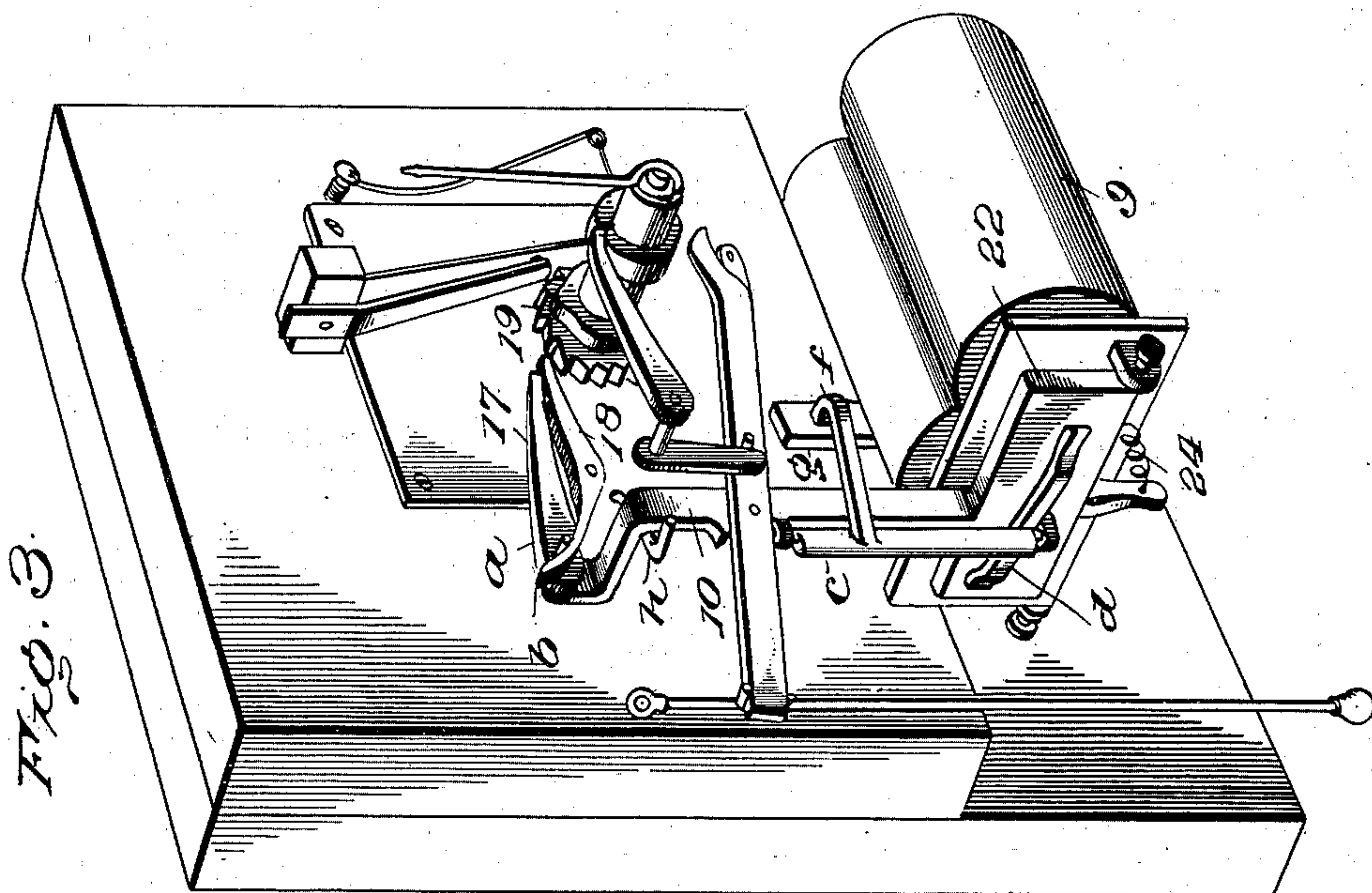
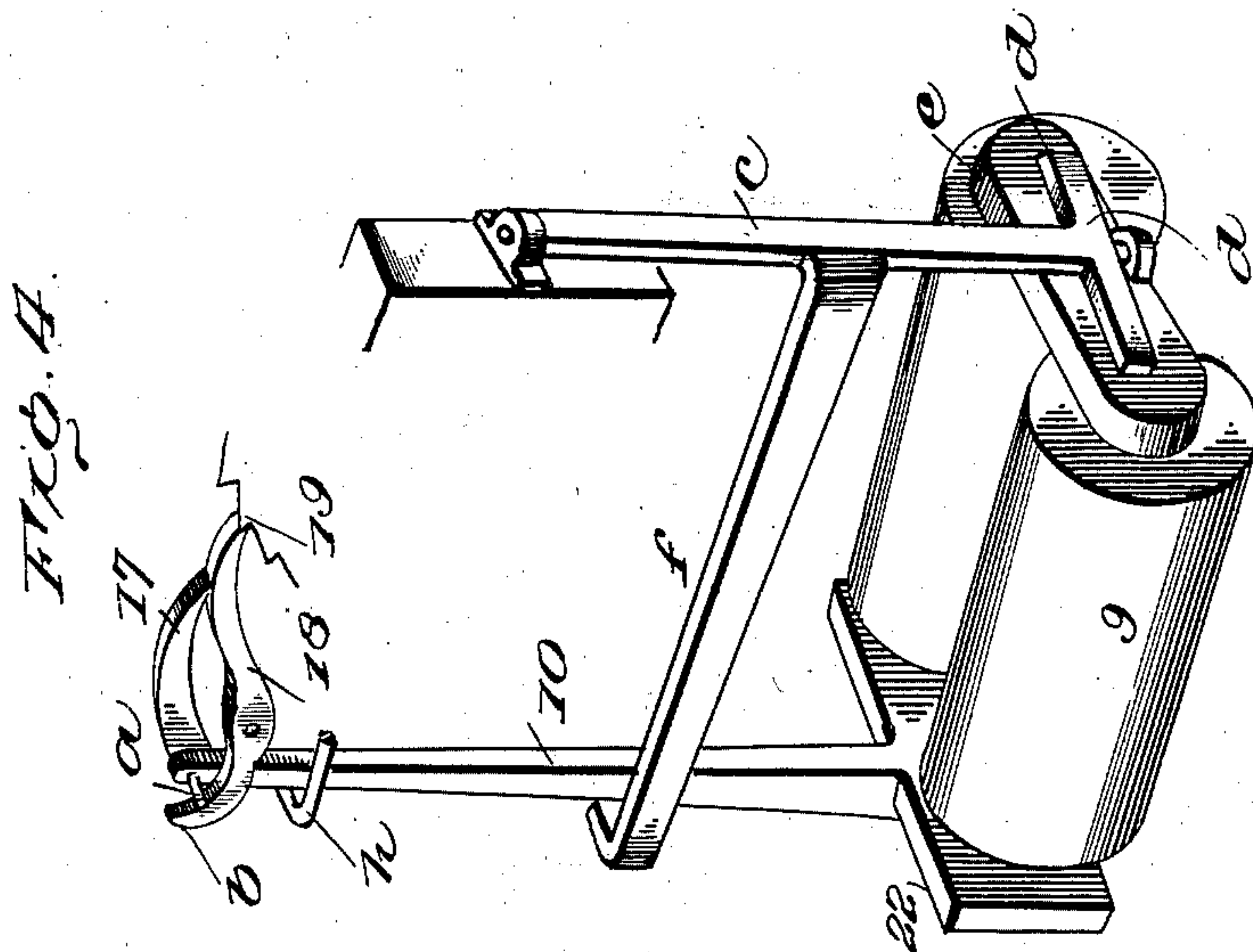
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2 SHEETS—SHEET 2.



Witnesses

*J. M. Moore*  
*W. A. Woodson*

*H. Redmon*  
*R. L. Hall*  
*R. H. Conway*

By

*R. H. Conway*  
Attorneys



## UNITED STATES PATENT OFFICE.

HOPE REDMON, RUFUS L. HALL, AND ROBERT H. CONWAY, OF  
CYNTHIANA, KENTUCKY.

MEANS FOR SYNCHRONIZING THE INSTRUMENTS OF TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 752,710, dated February 23, 1904.

Application filed September 17, 1903. Serial No. 173,613. (No model.)

*To all whom it may concern:*

Be it known that we, HOPE REDMON, RUFUS L. HALL, and ROBERT H. CONWAY, citizens of the United States, residing at Cynthiana, in the county of Harrison and State of Kentucky, have invented certain new and useful Improvements in Means for Synchronizing the Instruments of Telephone Systems, of which the following is a specification.

This invention appertains to party systems whereby intercommunication is effected electrically and in which each subscriber is provided with an instrument constructed to admit of establishing communication with any other party on the line to the exclusion of the remaining parties, which are locked out and prevented from interrupting or listening to the correspondence conducted by the individuals preoccupying the line. Systems of this character are provided with selective mechanism and communicating means with the exchange or central, whereby any person may through central be placed in communication with any other subscriber on the line. It frequently happens that through one cause or another the instruments become disarranged and are thrown out of accord or consonance, and to synchronize the same it is necessary to send out a lineman to locate the trouble and remedy the same. This proceeding besides being expensive is the source of no end of trouble and inconvenience, all of which it is the purpose of the present invention to obviate.

In accordance with this invention each instrument of a system or party-line is provided with an electric release controllable from central or exchange for synchronizing the instruments in a moment's time, said release mechanism throwing the detent of the instrument out of operation, whereby the resetting mechanism comes instantly into play for returning the working parts of the instrument to zero or normal position, whereby all the instruments are brought into harmony.

The invention is applicable to any system including telephone, telegraph, or other type of instrument for transmitting messages and embodying a plurality of instruments, includ-

ing selective and lock-out mechanism, whereby any two parties may occupy the line to the exclusion of the other subscribers or parties on the same line, either without being interrupted or the messages intercepted. Systems of the type aforesaid have the instruments provided with an electromagnet constituting the essential feature of the selective mechanism, said electromagnet being controllable from a given point, as central or exchange. It is well known that the polarity of electromagnets may be changed and is controllable by the direction of travel of the electric current through the helix, and this principle is employed in the present instance as the means for effecting operation of the release mechanism.

The invention consists, essentially, of a permanent magnet mounted with reference to the electromagnet of the selective mechanism, so as to be operated by the change of polarity of said electromagnet, a stop operated by means of said permanent magnet and arranged to cooperate with a companion stop to normally limit the movement of the armature of the electromagnet in one direction, but which when thrown out of action admits of said armature of the selective electromagnet having a greater movement, whereby a stop carried thereby throws the detent, by means of which the resetting mechanism is held in check, out of action, whereby said resetting mechanism instantly comes into play and returns the instrument to normal position.

The invention also consists of the novel features and details of construction, which hereinafter will be more particularly set forth, illustrated, and finally claimed.

In the drawings hereto attached and forming a part of this specification, Figure 1 is a detail view of an electric instrument of a type for use in a selective and lock-out system of intercommunication and showing the means at central or other determinate point for establishing communication between any desired parties on the line. Fig. 2 is a detail view of a portion of the electromagnet, its armature, and the permanent magnet cooperating therewith. Fig. 3 is a perspective view



of the selective lock-out mechanism of an instrument of the variety for which the invention is designed. Fig. 4 is a perspective view of a modification, showing a different manner of mounting the permanent magnet.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The mechanism shown has been selected to demonstrate the application of the invention and is typical of the kind of instrument to be used in series on a selective and lock-out system of electric intercommunication. The electromagnet 9 is in circuit and is adapted to be energized from central, exchange, or like determinate point. The armature coöperating with the selective electromagnet 9 is indicated at 22, and 10 is the arm thereof, carrying the operating or feed pawl 17, which engages with a tooth of the ratchet-wheel 19 at each operation of the electromagnet, so as to turn the ratchet-wheel 19 and the operating parts connected therewith the distance of one tooth each time the electromagnet is energized. The detent-pawl 18 coöperates with the teeth of the ratchet-wheel 19 to prevent backward rotation thereof. In instruments of this type after the ratchet-wheel 19 has made the predetermined travel the detent-pawl 18 is automatically tripped, thereby permitting the resetting mechanism to return the parts to zero or an initial or starting position. Inasmuch as these parts are well known and may be of any construction according to the type of instrument employed, it is not deemed necessary to enter into a detailed illustration or description of the same, as they form no part of the present invention other than being adjunctive to the mechanism, whereby the detent-pawl 18 may be thrown out of action at any moment to permit synchronizing of all the instruments of a system should any one become disarranged from any cause.

The armature 22 is normally held away from the core of the electromagnet 9 by means of the springs 24, and the feed-pawl 17 is pivoted thereto.

A pin *a* projects laterally from the arm 10 across the path of the tail *b* of the detent-pawl 18, so as to come in contact with the tail-piece *b* and trip the detent-pawl and throw it out of engagement with the teeth of the ratchet-wheel 19, thereby permitting the resetting mechanism to act and to turn the parts to zero or starting position. The pin *a* constitutes a stop or trip and may be of any construction so long as it admits of the performance of the desired function.

A permanent magnet *c* coöperates with the electromagnet 9 and is preferably journaled to the arm 10 and armature 22 and is provided at one end with a broad pole-piece *d*, which is in the field of the core of the electromagnet. As shown in Figs. 1, 2, and 3,

the pole *d* is opposite and adjacent to the armature 22, whereas in the construction shown in Fig. 4 the magnet *c* is located at the opposite end of the electromagnet and the pole *d*, adjacent to the yoke *e*, connecting the members of the core-pieces of the electromagnet. A stop *f* is attached to the permanent magnet *c* at one end, and its free end is hooked and adapted to engage with either a corresponding stop *g* or with the arm 10, as shown most clearly in Figs. 3 and 4. The stop *f* consists of a rod attached to the magnet *c* in any manner and having its hooked end arranged to effect a limit of the movement of the arm 10 and armature 22 in one direction, whereby under normal conditions the stop or trip *a* is prevented from contact with the tailpiece *b*. The arm 10 under normal conditions is limited in its outward movement by the stop *f*; but when said stop *f* is thrown out of the path of the arm 10 the latter moves under the tension of the spring 24 until it comes in contact with the stop *h*, and during this movement the pin or stop *a* is brought in contact with the tailpiece *b* and trips the latter, so as to throw the detent 18 out of engagement with the teeth of the ratchet-wheel 19. This operation is effected by the change of polarity of the electromagnet 9 in the manner now to be described.

As shown in Fig. 1, electric conductors 6 and 8 for connecting the instruments in series communicate with the circuit-closing mechanism at the central, exchange, or other determinate point. The electric battery is indicated at 64, and any means may be adopted for reversing the current through the conductors 6 and 8, as indicated by the full and dotted lines at the lower left-hand portion of Fig. 1. When the current is sent through the conductors in one direction, the polarity of the electromagnet will be of one nature, as indicated by the plus and minus characters in Fig. 2, and when the electric current through the conductors is in the opposite direction the polarity of the electro magnet or magnets will be reversed—that is, the pole formerly plus will be minus and the pole minus will be plus. The magnet *c* being permanent, its polarity remains unchanged, and by having the pole-pieces *d* extended, so as to come opposite the plus and minus poles of the electromagnet, it will be understood from the well-known principle of repulsion and attraction of like and unlike magnetism that one or the other end of the pole *d* will be attracted or repelled, depending upon the nature of the polarity of the electromagnet 9. The movement of the magnet *c* incident to the attractive and repellent force of one or the other ends of the pole *d* causes the stop *f* to move either into the path of the stop *g* or arm 10 or away from said parts. The residual magnetism of the pole *d* is sufficient to hold the magnet *c* in either one of its two positions.



When the instruments of a selective and lock-out system of electric intercommunication are in accord or consonance, the stop *f* of each instrument occupies the position so as to limit the movement of the armature 22 and arm 10; but should any instrument be disarranged, so as to throw the instrument out of harmony or agreement, the current may be reversed through the electromagnets from the central or exchange to throw the stop *f* out of the path of either the stop *g* or arm 10, thereby permitting the latter to move under the tension of the spring 24 until arrested by the stop *h*, and during this movement the pin or trip *a* will come in contact with the tail-piece *b* and throw the detent 18 out of contact with the teeth of the ratchet-wheel 19, thereby permitting all the instruments to return to a normal position, whereby they are synchronized and caused to move in unison as the circuit is successively made and broken as rendered necessary to bring any party in communication with any other party on the line or system.

Having thus described the invention, what is claimed as new is—

1. In an electric system of intercommunication, and in combination with the selective electromagnet of each instrument, the armature coöperating therewith, a feed-pawl adapted to be actuated by said armature, a detent-pawl, an operating device provided with ratchet-teeth for coöperation with the feed and detent pawls, a permanent magnet pivotally mounted and controlled in its movements by the change in polarity of the electromagnet and having oppositely-extended pole-pieces, a stop projected from the permanent magnet, and having a portion to extend across the path of the armature to limit its movement in one direction whereby under abnormal conditions the detent-pawl of the instruments may be tripped and all the instruments synchronized, substantially as specified.

2. In an instrument of the character described, the combination of the selective elec-

tromagnet, the armature coöperating therewith, a feed-pawl connected with said armature for actuation thereby, a ratchet-wheel connected with the operating parts of the instruments, a detent-pawl, a stop connected with the armature for tripping the detent-pawl, a permanent magnet pivotally mounted upon and carried by said armature and adapted to be controlled by the change in polarity of the aforesaid electromagnet, and means for normally limiting the amplitude of movement of the armature and adapted to be thrown out of action by reverse movement of the permanent magnet to admit of tripping the aforesaid detent-pawl to admit of synchronizing all the instruments of a system, substantially as set forth.

3. In an instrument of the character described, the combination of an electromagnet, the armature coöperating therewith and having an arm, means for throwing the armature away from the electromagnet, a feed-pawl carried by the arm of the armature for operation thereby, a ratchet-wheel connected with the operating parts of the instrument, a detent-pawl, a trip carried by the arm of said armature for throwing the detent and feed pawls out of contact with the ratchet-wheel, a permanent magnet pivotally connected with said armature and its arm and adapted to be controlled by the change of polarity of the aforesaid electromagnet, and a stop carried by the permanent magnet for limiting the outward movement of the electromagnet and adapted to be controlled by the change in polarity of said permanent magnet, substantially as and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

HOPE REDMON. [L. S.]  
RUFUS L. HALL. [L. S.]  
ROBERT H. CONWAY. [L. S.]

Witnesses:

FRANK A. VAN DEREN,  
A. S. AMMUMAN.