(No Model.)

G. H. BLISS.

Telephone Signal.

No. 241,598. **Patented May 17, 1881.**

FIG. 1.

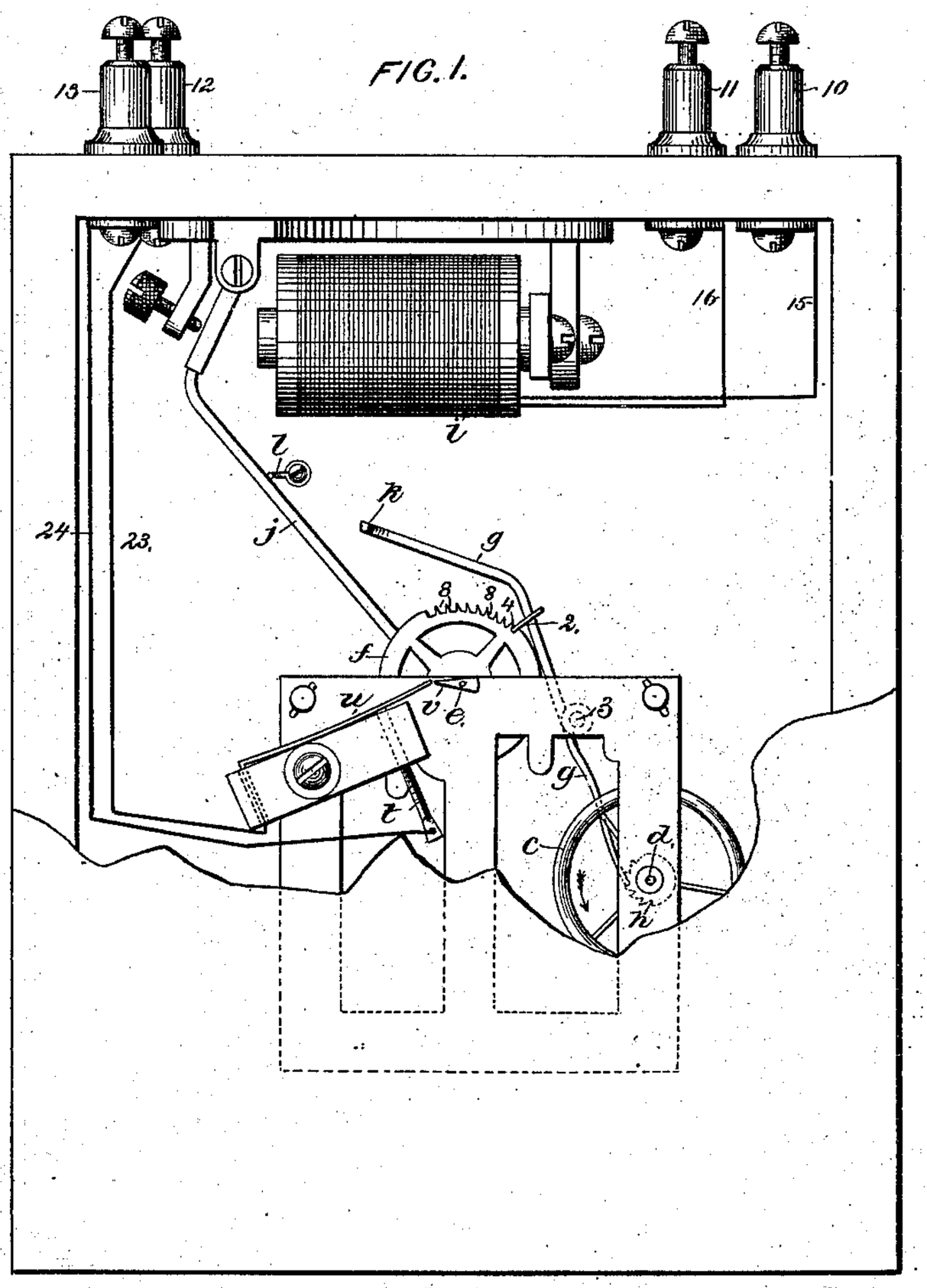


FIG. 3.

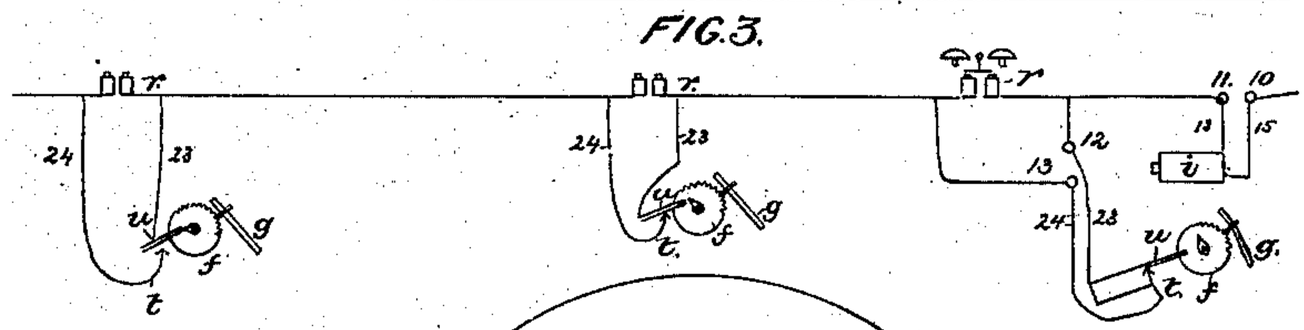
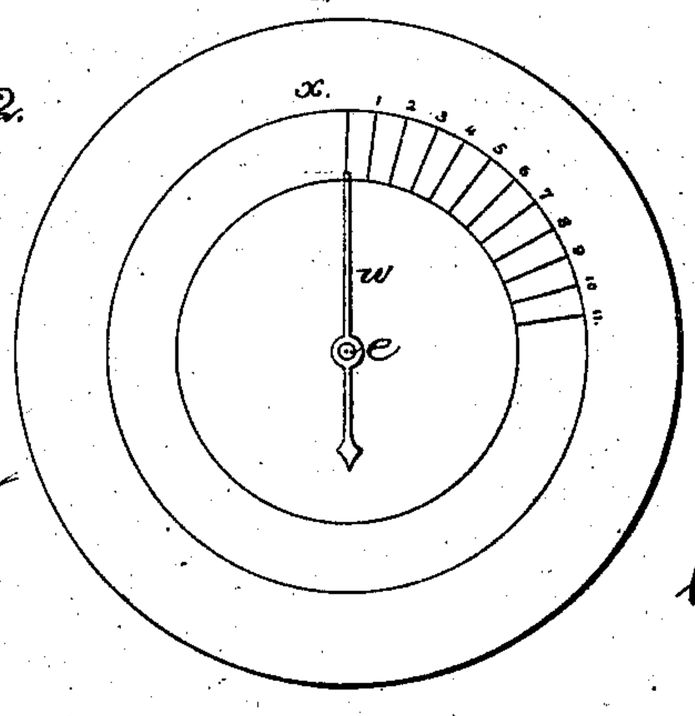


FIG. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE H. BLISS, OF PITTSFIELD, MASSACHUSETTS.

TELEPHONE-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 241,598, dated May 17, 1881.

Application filed March 18, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. BLISS, of Pittsfield, county of Berkshire, State of Massachusetts, have invented an Improvement in Telephone-Signals, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to an individual signal apparatus adapted for use on telephone-circuits, and is intended as an improvement on the invention embodied in a former application for Letters Patent filed by me November 29, 1880, to which reference may be had. In the said application a series of signal-controlling insfruments were employed, each consisting of a clock-work or other mechanical motor having a uniform rate of motion synchronous with the others of the series, each being adapted to bring its corresponding signal into operative condition during a portion of its movement, the times of such operation being different at each instrument, and the said instruments being provided with automatic stop mechanism, by which they are all simultaneously stopped after each, in turn, has maintained its signal in operative condition for a certain period sufficient for the proper sounding of the said signal. By this arrangement only one of the signals can be sounded at any one time, and the operator, by waiting until the proper time, can sound any desired one of the signals without affecting the others. A sufficient time has to be allowed, however, for the sounding of each one in turn, so that if the seventh or eighth one of the series were to be sounded the operators would have to start all the controlling clock-works, and then wait until sufficient time had elapsed for calling all the first stations before the time for calling the desired station arrived. This makes the operation of signaling somewhat slow, and, moreover, the time in which the signal at a given station can be operated has to be made as short as possible, so that the aggregate time needed to give all of the stations (each in turn) a chance to be called should not be too great.

In the said apparatus separate electro-magnets are employed for starting the signal-controlling mechanism and for sending the signal when permitted by the said controlling mechanism, and suitable circuit-controllers are employed to cause only one of the said magnets at each instrument to be in circuit at a time, so that when the starting-magnets are in circuit the signal-controlling magnets are shunted or cut out, and the reverse.

In my present invention I have so arranged the signal-controlling mechanism, provided with a stop mechanism similar to that of my said former application, that they all may be started simultaneously by the starting-magnet, and in their subsequent movement will bring one after the other of their signal-magnets into operative condition in rapid succession, without, however, retaining them in such position long enough to be operated while the said controlling mechanisms are still running, and I have placed the stop mechanisms under the control of the operator through the said starting-magnet, which thus becomes a controlling-magnet for the clock-work, so that the said clock-works can be stopped at any desired point at which any desired one of the signaling-instruments is in condition to be sounded. And I have so arranged the stop mechanism controlled by the starting electro-magnet that the signal thus placed in operative position can be sounded without affecting the starting-magnets to start the controlling devices or clock-works. After the desired signal has been operated as long as necessary, the said controlling mechanism may be again started by the starting-magnets and allowed to run until they are all automatically stopped (as in my former application) at a common starting-point, so that they will be started in unison when they are next to be operated. By this arrangement only sufficient time is required to bring each signal to its operative position, and then to operate the signal, instead of having, as in my former arrangement, to consume sufficient time to operate all of the signals. In this instance the starting or controlling magnets require a current of greater strength to operate them to start the clock-works than is required to operate the signal, the latter being preferably operated by the short reversed currents produced by a magneto-electric generator, and the starting-magnets being operated by battery-currents.

Figure 1 is a front elevation of a sufficient portion of a signal apparatus to illustrate my present invention; Fig. 2, a face view of the

dial-plate and pointer thereof, and Fig. 3 a diagram illustrating the electric circuits.

The same notation is used as far as possible as in the former application referred to, to enable the two inventions to be more readily compared.

The main cam-shaft *e* is operated by a train of wheel-work terminating in a balance, *c*, the same as in the former application, the said wheel-work being omitted in the drawings, as it forms no part of the present invention.

The stopping device *g*, pivoted at 3, and adapted to engage the stop-cam *h* (shown in dotted lines, Fig. 1) on the shaft *d* of the balance *c*, is provided with a finger, 2, controlled by the controlling-disk *f*, as in my former application. The said stop-lever *g* is provided with an arm, *k*, adapted to be engaged by the finger *j* on the armature of the starting-magnet *i*, as in my former application; but the said armature is so located relative to the poles of the magnet, and its retracting-spring *l* is made of such strength, that the currents employed for operating the signal-magnets, one of which is indicated at *r*, Fig. 3, will not cause the finger *j* to engage the arm *k* and raise the projection 2 of the stop-lever *g* out of the notches 4 of the controlling-disk *f*; but a sufficiently-strong current will so operate the said armature and stop-lever *g*, and allow the clock-work to start, as in my former application.

In the present application the starting-magnet *i* remains continually in circuit, and its shunt and circuit-closer and operating-cam (shown in the former application) are omitted. The circuit-closer *t u*, controlling the shunt around the signal-operating magnet *r*, is operated by the cam *v*, which, instead of being constructed to hold the said circuit-closer open while the clock-work is running for a considerable period, is so made as to open the said circuit-controller only for a moment, and as the shaft *e* continues to revolve to immediately close it. The said cams *v* in the different instruments are so placed relative to the notch 4 in the controlling-disk *f* that as the controlling-disks and their shafts *e* start simultaneously to rotate the said cams *v* will open the circuit-closers *t u* in turn, each one just after the previous one has been closed by the point of the cam *v* passing beyond the spring portion *u* of the circuit-closer

The controlling-disks *f* are provided with a series of stop-notches, 8, to receive the projection 2 of the stop-lever *g* and cause the said lever to engage the stop-cam *h* of the balance *c* just when one of the cams *v* is holding one of the circuit-closers *t u* open, and the shaft *e* is provided with a pointer, *w*, (see Fig. 2,) that indicates, in connection with the dial *x*, the moment at which the different stop-notches 8 are in position to receive the projection 2 of the stop-lever.

In operation, the instruments all being stopped, as shown in Fig. 1, with their projections 2 in the stop-notches 4 and the cams *v* of the different instruments at different distances from the springs *u*, a strong current is thrown upon the main circuit, passing to the binding-screw 10 of the first instrument, and thence through the wires 15 and 16 and the coils of the starting-magnet *i* to the binding-post 11, and thence to the binding-post 12, and by the shunt-wire 23, circuit-closer *t u*, and shunt-wire 24, to the binding-screw 13, and thence to the binding-screw 10 of the next instrument, and so on, the circuit closers *t u* being all closed and the signal-magnets *r* (interposed in circuit between the binding-screws 12 13) all short-circuited by the said circuit-closers and wires 23 and 24. The current thus thrown on is of sufficient strength to cause the finger *j* to act on the arm *k* and disengage the stop-lever *g* from the stop-cam *h*, causing all the clock-works to start simultaneously. If the circuit is immediately broken, the stop-arm *g* will no longer be held by the finger *j*, but the projection 2 will fall on the inclined rear side of the tooth formed between the stop-notch 4 and the next stop-notch 8, and the clock-works will continue moving until the said stop-notch 8 arrives under the projection 2, which will then fall therein and automatically stop the clock. In this movement the cam *v* of the first instrument of the series will have raised the spring *u* from contact with the spring *t*, and thus opened the shunt between the wires 12 and 13, so that the succeeding currents that pass over the circuit will be obliged to pass through the signal-magnet *r* at that station and cause it to operate its signal, while the cams *v* of all the other instruments have not yet reached the spring *u*, so that the corresponding signal-magnets still remain cut out. The pointers *w* will now all stand opposite the line marked 1 on the dial, thus indicating that the signal at station 1, and that alone, can be operated. If, now, another current is thrown upon the line and through the magnets *i*, the clock-works will again be started; or, if the current were maintained steadily through the said magnets, they would continue moving, and immediately after the pointers passed the first mark the spring *u* of the first instrument would drop, cutting the corresponding signal-magnet out again, and just as the pointer arrived at the second mark, and the projection 2 was above the second stop-notch 8, the cam *v* at the second station would raise the spring *u* and throw the second signal in circuit, and so on. The operator accordingly waits until the pointer has passed the line numbered one less than the number of the station he wishes to call, when he opens the circuit or demagnetizes the magnet *i*, so that the projection 2 of the stop-levers *g* will fall in the next stop-notch 8, when the signalizing-magnet *r* will be in circuit at the station desired to be signaled.

The stop-cam *h* on the shaft *d* of the balance *c* is provided with a series of stop-shoulders forming a series of ratchet-like teeth, so that the stop-lever *g* will always engage the

said cam when the balance *c* is nearly at the end of its oscillation, the stop-notches 4 8 in the controlling-disk *f* being so located that the projection 2 falls therein, while the balance *c* is moving in the direction of the arrow, Fig. 1. The amplitude of movement of the balance *c* varies with the decreasing strength of the mainspring as it runs down in the well-known manner, so that the stop-lever *g* will engage different teeth of the stop-cam *h* at different times; but the balance will always start off when released by the said stop-lever with an amplitude of vibration nearly the same as that which it had when it stopped.

I have found, in practice, that a movement occupying two seconds of time is required to open and close the circuit-controllers *t u*, so that if there be ten stations only twenty seconds will have to elapse before the last of these stations is brought into condition to be signaled, while with the former plan five or six seconds have to be allowed for signaling each station, so that nearly a minute will have to elapse after the starting of the clock-works before the tenth station could be signaled, and then its signal-bell could only be sounded for three or four seconds, and if it failed to call attention the clocks would have to be started again and another minute wasted, while with my present invention, when the station is once brought into condition to be signaled, it is retained so as long as desired, so that its signal-bell may be continually operated, if need be, until the return-signal is given.

In Fig. 3 the stop-levers are shown as having their projections 2 engaged in the third stop-notch 8 from the one, 4, in which they rested when the clocks were at their common starting-point and the circuit-closer *t u* at the third station is open, so that the signal can be operated there. After a station has been signaled the strong current is thrown on, and the stop-levers *g* thus remain disengaged from the controlling-disk *f* until all the stop-notches 8 have passed beyond the projection 2, the pointers *w* then having passed beyond the numbered marks on the dials *x*, when the magnets are demagnetized, and the levers *g* allowed to remain with their projections 2 resting on the blank surface of the controlling-disk *f* until the first or main stop-notch 4 receives the said projection and causes the clocks to stop, as in my former application.

If desired, there may be two or more cam-points *v* and two or more corresponding marked and numbered portions of the dial; but it is desirable to have a blank space on the surface of the controlling-disk *f*, between its different notched portions, so that if the shafts *e* do not run in exact unison the stop-levers *g* may be kept disengaged from the controlling-disk *f* long enough to insure that the notched portion of the slowest of the said disks shall have certainly passed beyond the projection 2, and then, when the stop-lever is dropped, it will stop the clock when the notch 4 of each arrives under the projection 2, be it sooner or later, and the clocks will all be ready to start again simultaneously.

Currents of different polarity may be employed to operate the controlling and signaling magnets independently; or any other characteristic difference may be made use of.

The signal-magnet may be placed in a local circuit controlled by a circuit-closer or otherwise.

I claim—

1. In an individual signal apparatus, a series of controlling-instruments, each consisting of a mechanical motor or clock-work adapted to run synchronously with the others of the series and to control the operation of the corresponding signal, and stop mechanism for the said motor having a series of definite stop-points, as described, corresponding to the operative positions for the signals at the different stations, combined with the controlling-magnet for the said stop mechanism, whereby an operator is enabled to start the said controlling-motors simultaneously, and then stop them at any desired point at which a signal is in condition to be operated only at the station desired, substantially as described.

2. The balance of a mechanical motor and the stop-lever therefor, combined with the stop-cam *h*, provided with a series of teeth or stop-shoulders, substantially as and for the purpose described.

3. The motor, stopping device therefor, and controlling-disk operated by the said motor, and provided with a series of stop-points, combined with the circuit-controller and actuating-cam therefor, operated by the motor as described relatively to the controlling-disk, whereby the said circuit-controller is operated by its cam only when the controlling-disk is in position to engage the stopping device at a definite one of its stop-points, substantially as described.

4. A series of signaling-instruments, each consisting of a clock-work or mechanical motor, the stop mechanism therefor, and its controlling-magnet, constructed or adjusted to be operated only by currents of a definite character, combined with a signal-magnet, and shunt and circuit-closer therefor, controlled by the said motor, the said signal-magnet being properly constructed to operate by currents of a character that do not operate the controlling-magnet, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE H. BLISS

Witnesses:

JOHN F. VAN DEUSEN

GEO. F. PERHAM.