

(No Model.)

2 Sheets—Sheet 1.

A. D. SUNDEEN, S. B. MOLANDER, G. W. ANDERSON
& A. M. CARLSEN.

SIGNAL ATTACHMENT FOR TELEPHONES.

No. 454,503.

Patented June 23, 1891.

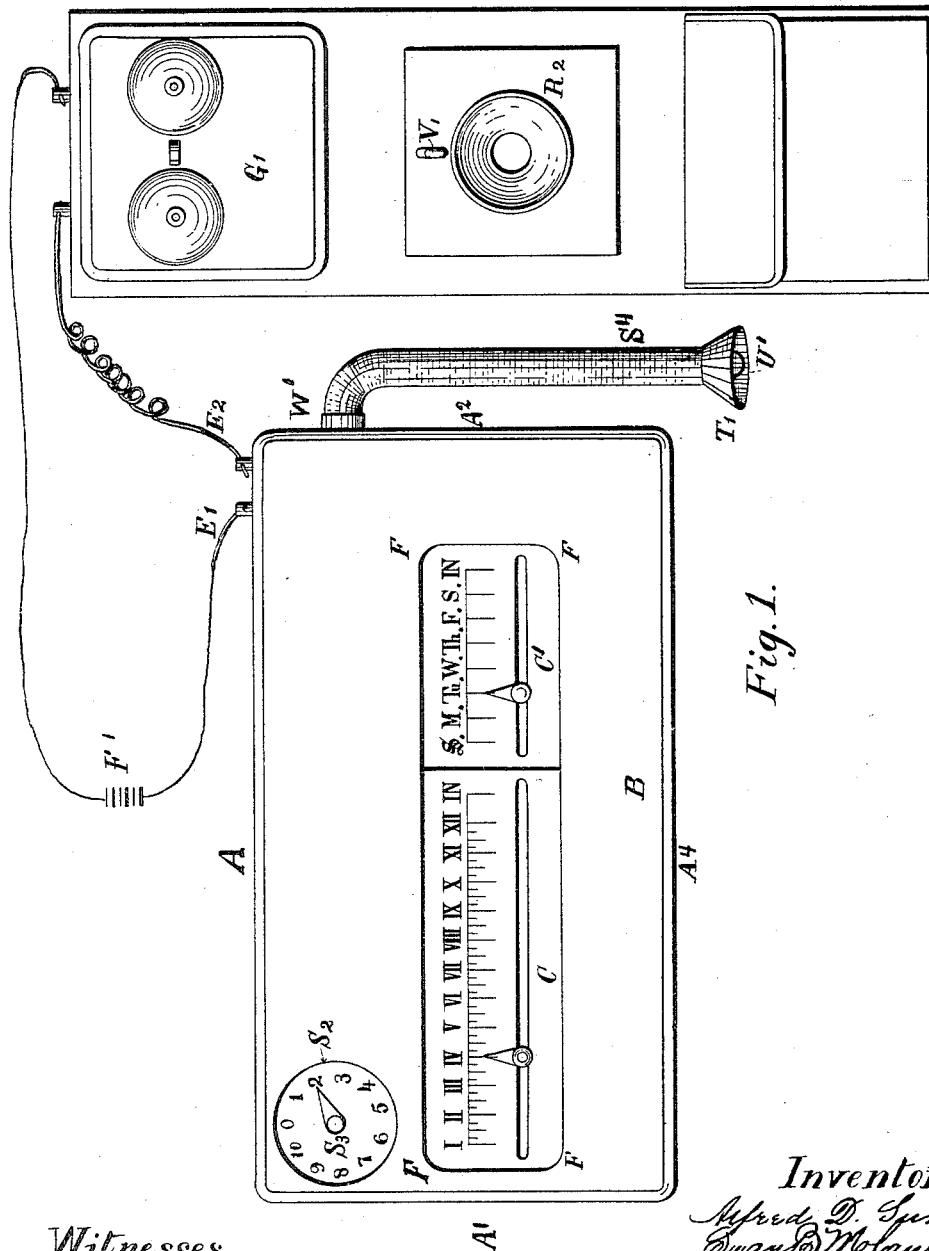


Fig. 1.

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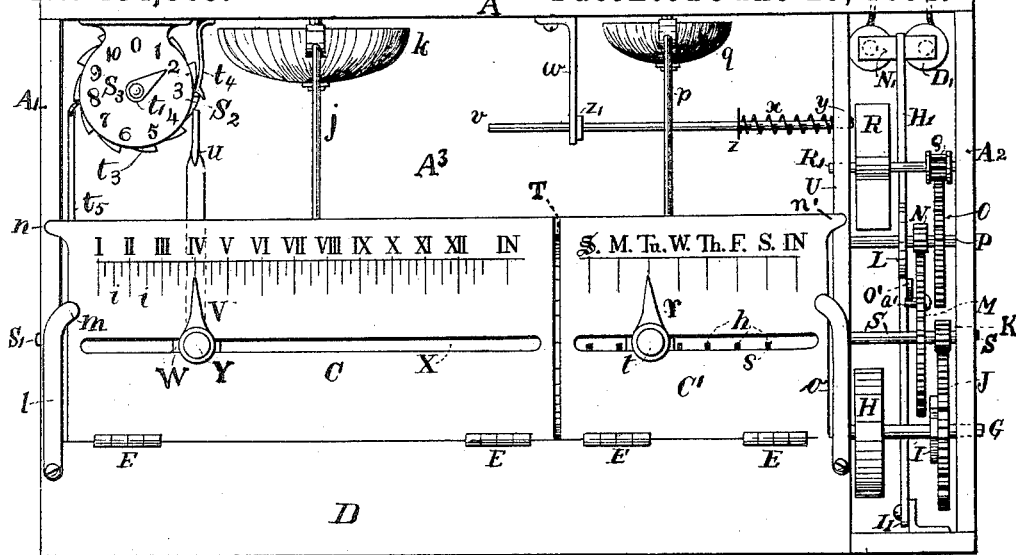


Fig. 2.

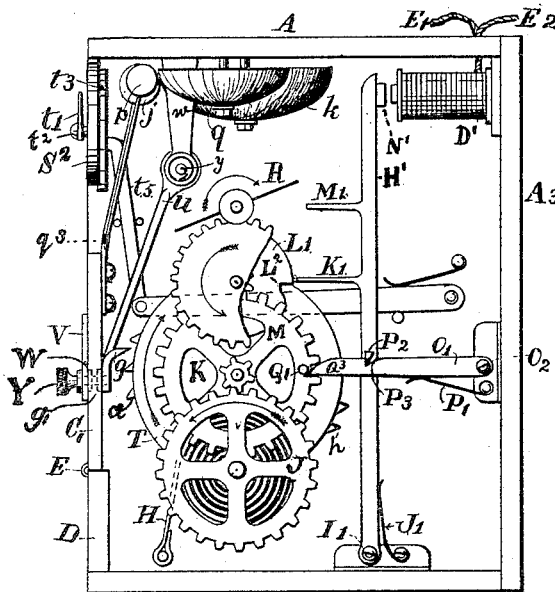


Fig. 3.

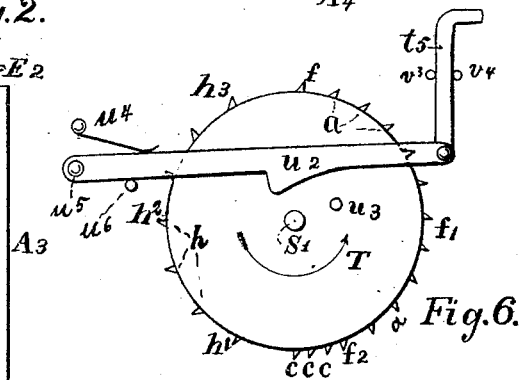


Fig. 6.

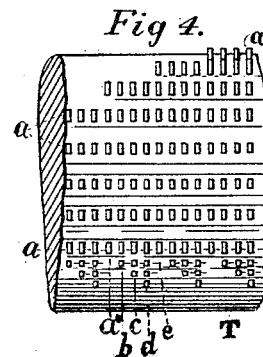


Fig. 4.

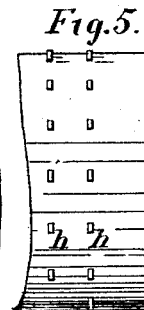


Fig. 5.

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UNITED STATES PATENT OFFICE.

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SIGNAL ATTACHMENT FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 454,503, dated June 23, 1891.

Application filed June 23, 1890. Serial No. 356,369. (No model.)

To all whom it may concern:

Be it known that we, ALFRED D. SUNDEEN, SWAN B. MOLANDER, and GUSTAF W. ANDERSON, of Mora, county of Kanabec, and ANDREW M. CARLSEN, of St. Paul, in the county of Ramsey and State of Minnesota, citizens of the United States, have invented certain new and useful Improvements in Signal Attachments for Telephones; and we do 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 appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Our invention relates to signal attachments for telephones, and has for its objects to enable the telephone in the absence of an operator or attendant to automatically inform parties ringing up the telephone that there is no one to answer them, and also to inform them as to what time the absent operator will return to his office, so that they may know when to call him up again.

A further object of our invention is to enable the telephone to produce a visible record of how many times it has been rung up during the absence of the operator, and thus indicate to him at his return to the office the importance of remaining there at the time his signal-instrument has promised that he would be back to his office.

A still further object is to produce a return-signal that gives audible information through the telephone and also gives legible information to those calling in person.

We attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of our signal apparatus shown as connected with a telephone. Fig. 2 is another front elevation of the instrument, but disconnected from the telephone, and with the door of the case removed, so that the interior may be viewed and explained. Fig. 3 is an end elevation of Fig. 2 with the end wall A² and the strip U removed, also the lid C', with the pointer *r* and hook, like *g*, removed, leaving, however, the hammer *p* cut off at *q*³. Figs. 4, 5, and 6 are

detail views of portions of the roller provided with pegs for operating the signal-hammers upon the signal-bells. Fig. 6 also shows how the roller operates the mechanism that records the number of calls.

Similar letters refer to similar parts throughout the several views.

The invention consists, mainly, of a gearing of several cog-wheels and pinions operated by a winding-spring, and the speed of their motion is regulated by a wing or fan similar to the striking mechanism of an ordinary clock. Upon one of the shafts of the said wheels is fixed a roller provided with pegs projecting from its surface for operating hammers or clappers, which strike on bells, according to the arrangement of the pegs, and thus give different signals that may be heard through the telephone-line in the same manner that a verbal answer would be heard.

In the drawings, A, A', A², A³, and A⁴ represent the case of the instrument; B, the cover or door of it.

C and C' are lids pivoted or, in the present instance, hinged by the hinges E E to the strip D, which is rigidly fastened to the case.

F F F F is an opening in the door of the case for viewing and for reaching the lids C and C' to set the time-indicators and their mechanism, which will hereinafter be fully described.

G is the winding-stem, upon which an ordinary clock-key or crank may be placed, and by turning which the spring H is wound up, and by means of the ratchet-pawl and ratchet-wheel I the said spring H will cause the wheel J to revolve. The said wheel J, engaging with the pinion K, turns the shaft S and the wheel M, secured thereto. The wheel M turns the pinion N and the wheel O, both secured upon the same one shaft P. The wheel O finally turns the pinion Q and the rotary fan or wing R, both secured to the same one shaft R'. All of the said shafts are journaled in a suitable frame, which in the present instance consists of the end wall A² and the strip U, which is secured at both ends to the walls A and A⁴ and in width extends from the front edge of the wall A⁴ and about half-way back toward the bottom A³ of the case, thus leaving a large passage for the sound of the bells

to reach the end A^2 of the case, where the sound-transmitting tube S^4 in the present case is connected.

The shaft $S S'$ extends through the entire case, and is journaled besides, as before described, also in the wall A' , as shown at S' . Upon this long shaft $S S'$ is secured a roller T , of a length about equal to the two hinged lids C and C' together. Upon the one side of the portion of the roller T that coincides in its length with the lid C are fixed side by side in vertical direction of the roller rows or lines of pegs a , over the tops of which the hook g plays when the roller revolves, as will presently be more fully described. Each row of pegs a has a different number of pegs in it, corresponding to the different hours of a clock, as will be readily understood from Fig. 4, which shows a portion of the side of the roller referred to. The row of pegs marked a' contains six pegs, corresponding to six o'clock. The row of pegs marked e has seven pegs, corresponding to seven o'clock, and so on, commencing with one peg for one o'clock and ending with twelve pegs for twelve o'clock. To the one side of each of those twelve rows which indicate the full hours only we arrange several other rows of pegs for indicating fractions of each hour. In the present instance the hours are divided only into fourths, and this is accomplished by having after each row indicating full hours, and in which the pegs are placed a considerable distance apart, three other lines of pegs indicating the quarters of the hour by having first the pegs indicating the hour, as already described, and then having at the end of such a row of pegs fixed one, two, or three pegs at a considerable shorter distance apart than the pegs indicating the full hours. Each of said short-distanced pegs indicates one-fourth of an hour. Thus, for example, in Fig. 4, where the quarter-hour pegs are shown as being smaller and closer together than the other pegs, the row b , having six ordinary pegs and one small peg at the end of it, will cause the hammer j to strike slowly upon the bell k six strokes for six o'clock, and then quickly make one more stroke, which means a quarter past six. The next row c , having two small and short-distanced pegs, will, after delivering the six strokes, make two more strokes in rapid succession, which signal will indicate six and two-quarters, or half-past six. The next row d , having six regular pegs and three of the short-distanced pegs, will signal six and three-quarters, or a quarter to seven. The next row e has seven regular pegs, which will give seven strokes, thereby indicating seven o'clock. The next higher row will be seven and a quarter, and so on, with all the hours indicated upon the roller. The opposite side of the roller has no pegs, except upon the portion of it registering with the lid C' , where it has seven rows of pegs h , corresponding to the number of days in the week. The first

one of said rows has only one peg, representing the first day in the week, or Sunday. The next row contains two pegs, indicating the second day, or Monday. The third row of pegs contains three pegs for the third day of the week, and so on until Friday and Saturday are indicated by six and seven pegs, as shown in Fig. 5, which represents a small portion of the side of the end of the roller referred to.

The end view, Fig. 6, of the roller illustrates further how even the longest lines of pegs a and h are located upon opposite sides of the roller at the same time that they occupy different portions of it in a longitudinal direction, as stated. The line of the pegs a , extending along f, f' , and f'' , inclusive, represents by its twelve pegs twelve o'clock, and the three pegs $c c c$ succeeding the 12, but being placed closer together, represent fourths of an hour, so that the entire line $f f' f''$ and $c c c$ will indicate twelve and three-quarters of an hour, or a quarter to one, while upon the opposite side of the roller and registering with the lid C' the line of seven pegs h', h^2 , and h^3 represents the seventh day of the week.

The outside of the lid C is provided with the numerals from 1 to 12, inclusive, corresponding to those on the face of an ordinary clock. To the one side of each of said numerals are drawn marks $i i$, indicating one-fourth, one-half, or three-fourths of an hour, and the word "In" is marked upon the lid, as shown. A pointer V , having a guiding-block W , movably fitted in the slot X in the lid C , is connected through the said slot W by means of a thumb-screw Y with another sliding block g' , which forms a part of the hook g , that plays over the pegs a of the roller when the latter revolves. By loosening and tightening the said thumb-screw Y the block W and the pointer V may be moved to and secured at any desired place in the slot X , thereby setting the pointer V upon any of the hours or quarters of an hour indicated by the numerals or the marks $i i$, or upon the word "In," as described. By thus setting the pointer V the hook g , secured to the pointer by the thumb-screw Y , is automatically brought to register with the line of pegs on the roller T , that correspond with the time pointed out by the said pointer V . To the upper edge of the lid C is secured a hammer or clapper j for giving signal-strokes upon the bell k . This hammer j is operated in one direction by the pegs a , which in passing the hook g swings the hinged lid C and its hammer j away from the bell k , and in the other direction by the spring l , secured to the strip D by its lower end, while the upper and free end m actuates the lid and hammer toward the bell every time one of the pegs a releases the hook g . The lid C , when swinging the hammer toward the bell k , stops when its projecting corner n falls upon the edge of

the wall A' , as shown in Fig. 2; but the hammer j , having a springy arm, swings enough farther to strike the bell once. This diminishes its vibration, so that it will not reach the bell again until another of the pegs a operates it.

The mechanism of the instrument is such that when it is started the roller T makes only one revolution and then stops automatically until it is started again by another ringing of the telephone, as will presently be more fully described.

The arrangement of the lid C' is almost the same as that of the lid C , which has already been described; so it will readily be understood that the pegs h swing the lid C' and the hammer p away from the bell q , and the spring o swings it back toward the bell until the corner n' of the lid falls upon the strip U . The pegs h operate against a hook exactly like the hook g in Fig. 3, and the said hook is arranged with the thumb-screw t and pointer r exactly in the same way that the hook g is arranged with the pointer V and the screw Y , so that the pointer r may be moved and secured at any place in the slot s , so as to point to any of the letters representing the seven days of the week or upon the word "In" marked upon the lid C' , and by so setting the pointer v the hook (like hook g , but not shown) will register with the line of pegs h , that correspond to the day pointed out upon the lid. If, for example, the pointer r is set upon the letter "W," representing Wednesday, or the fourth day in the week, then the hook, like g , being screwed upon the point of screw t , will register with the line containing four of the pegs h , and thus when the roller makes one revolution the hammer p will make four strokes upon the bell, which signal indicates that the person having so set the machine will return to his office on the fourth day of the week, or Wednesday, while the hammer j gives the signal as to the hour or time of the day he will return. The pegs a and h being arranged on opposite sides of the roller, the one hammer finishes its signal-strokes before the other hammer commences to strike, and the two bells, being of different sizes, may readily be distinguished by their difference of sound. If only one bell is heard to give signal, it is always the hour-bell k , and if the two bells give signal the last one of them is the day-bell q . As long as the operator is in his office at least some time during each day in the week, he leaves the pointer r set at the word "In." This brings the hook, like g , outside of all the lines of the pegs h ; so the lid C' and bell q remain inoperative, while all the rest of the instrument may be used for giving signal as to the time of day the operator will return. If the operator is in the office all the time during the day, all he has to do to keep the instrument from running down at the ringing of other telephones is to move the pointer V over

to the word "In" on the lid C , and the arm u , which projects from the hook g and block g' , will push the sliding bar v , which is hung in the bracket w and the partition U , endwise against the resistance of the spring x until its end y engages with the fan R , and thus arrest the motion of all the gear-wheels, so that the calls by other telephones cannot start the instrument. When, again, it is desired to leave the office or the operator cannot be in, he moves the pointer V away from the word "In" and sets it at the hour or time he expects to return. As soon as the pointer V is moved away from the word "In" the arm u , being connected with the pointer V , moves away from the end of the sliding bar v , and the spring x , acting between the partition U and the fixed collar z , pushes the bar v back to its normal position, resting with its fixed collar z' against the bracket w , in which position the end y of the said bar v is withdrawn from contact with the fan R and leaves the entire machine free to work as soon as its starting mechanism, now to be described, is operated by the electric current of the circuit of the telephone to which it is connected.

The starting mechanism and the connection with and operation by the telephone are in the present instance as follows: Inside the case A we secure an electro-magnet D' , which is connected by its two wires E' and E^2 in the circuit of the telephone, as shown in Fig. 1, where F' represents the battery of a distant telephone. G' is the telephone with the signal-instrument. H' is a lever pivoted at I' and held away from the magnet D' by a suitable spring J' so far that its arm K' rests in the notch L^2 of the cam or disk L' , which is centrally secured upon and revolves with the shaft P and wheel O . In this the normal position of the lever H' the arm M' of said lever engages with the fan R and arrests motion of all the gear-wheels. Every time the telephone is rung up the electric current producing the ringing of the telephone-bell passes around the magnet D' and magnetizes it so that it attracts the anchor N' , secured to the free end of the lever H' . This withdraws the arm M' from the fan R , and the wheels are free to move by the force of the mainspring H . When the ringing of the telephone ceases, the current is broken and the magnet ceases to hold the lever H' away from the fan R , and the spring J' will drive the arm M' into a stopping contact with the fan R . To prevent the latter from taking place before the roller T has made one revolution and to secure just one revolution of it, we use a lever O' , pivoted to a suitable bracket at O^3 and actuated in an upward direction by the spring P' . Upon the one side of the lever H' projects a pin P^2 , that engages with the notch P^3 in the lever O' , whereby the anchor N' is held to the magnet, even if the magnetic force ceases, until the roller T has completed its revolution. When that is done or nearly,

so, the pin Q' , secured in the side of the wheel M , comes in contact with the free end Q^3 of the lever O' and moves the notch of the latter away from the pin P^2 , leaving the lever H' so far at liberty to swing back to its normal position; but as this would stop the fan R and the whole gearing, with the lever O' bearing against the pin Q' instead of against the pin P^2 ready to engage with the latter at the next movement that the magnet by attracting the anchor gives a chance for engagement, we let the circular edge of the disk L' resist the arm k' until the pin Q' has passed the free end Q^3 of the lever O' , when the notch L^2 in the disk L' receives the end of the arm K' , and thus the arm M' can engage with the fan R , and every part stops in its proper position. The arm K' , when resting against the outer edge of the disk L' , is short enough to permit the lever H' to lean so far away from the magnet that the notch P^3 of the lever O' cannot re-engage with the pin P^2 when the said lever O' swings up against it from its engagement with the pin P^2 , as already described.

To be able to easily conduct the sound of the bells with full force to the transmitter R^2 of the telephone, we use a flexible tube S^4 with a funnel-shaped end T' , which may readily be placed over the transmitter R^2 by placing the strap or ring U' upon the hook V' above the transmitter R^2 . The opposite end of the tube S^4 is connected with and opens into the case of the signal-instrument, as shown at W' .

Another feature of our invention is the call-indicator, which will now be described. Upon the bracket S^2 , projecting from the upper wall of the case of the instrument, is painted or fixed a dial S^3 with any desired number of signs or numerals circularly arranged upon it, and in the center of the circle is arranged an arbor t^2 , journaled in the bracket S^2 and carrying a dial-finger t' , that moves forward to the next higher figure or sign each time the telephone is rung up. In the present case the circle of numbers upon the dial contains only 0 and the numerals from 1 to 10, inclusive; but it is evident that in some cases it will be preferable to have the numerals to run much higher. The said dial-finger t' is fixed by its arbor t^2 to the ratchet-wheel t^3 , which in the present case has eleven teeth, but may have any desired number of teeth, according to the number of signs or numerals put on the dial S^3 . Every time the signal-roller T makes one revolution the pin u^3 , secured in the end of the roller T near the end S' of the shaft S , (see Fig. 6,) lifts the lever u^2 upward, so that its pivoted pawl t^5 , engaging with the teeth of the ratchet-wheel t^3 , moves the latter one tooth forward. When the roller moves the pin u^3 away from the lever u^2 , the spring u^4 swings the lever u^2 upon its pivot w^5 back to its normal position, resting upon the pin w^6 . This brings the pawl t^5 back into engagement with another of the ratchet-teeth. The spring-pawl t^4 serves

to hold the ratchet-wheel in position, so that it cannot move accidentally or move backward by the pawl t^5 playing backward over its teeth. In setting the dial-finger at 0 or any other desired number the operator simply takes hold of it and moves it forward, letting the pawls t^4 and t^5 play over the teeth of the ratchet-wheel. The pins v^3 and v^4 are guides for the pawl t^5 .

From the above description it will be seen that we produce a cheap, simple, and practical device that may be connected at any convenient place in the circuit of and near by a telephone, and when so connected will in the absence of its operator automatically by the ringing up of the said telephone get started, and will then, through certain numbers of strokes upon bells, the sound of which is conducted to the transmitter of the telephone and in the same manner as speech or other sounds, be heard through the receiver of the telephone and thus return a signal to the party that rung up the telephone, indicating the time at which the absent party will be back to his office, and also that we, in connection with such signal, produce a visible signal for callers, and, further, that our signal device, through its call-indicator, enables a party ringing up the telephone of a party absent from his office to leave through the telephone a message at the office of the absent party. The latter may be done by ringing the telephone up several times in succession, giving thereby the call-indicator any desired number of forward movements, and by mutual agreement between the users of telephones the different numbers of calls made in succession and shown by the indicator may represent words or sentences for the absent operator to read at his return.

Our signal apparatus as a whole is calculated to supply a want of long standing among parties like dealers in lumber, coal, wood, real estate, &c., who often have to leave their office vacated for a few hours to go to show up or deliver their goods; also for doctors, lawyers, and others who either have to leave their office at times or would do so to good advantage if they could depend upon their telephone to do the service that our present invention is calculated to do—namely, to answer and report calls—a service for which a great many nowadays keep a boy at a salary.

It will be understood by itself that the absence of the operator from his telephone is learned by the fact that the return-signal makes a reply at all and that the time signaled means the time when he will return. It will further be seen that our signal device when set by the person leaving the office will indicate to his partners or members of his family who may have access to his office the exact time of his return, and also that by having the signal-instrument so placed that it may be viewed from a window or from a door with glass panels any one calling at the

shut office may look at the signal-instrument and see at what time the absent party will return. Thus at the same time that the instrument answers and records the calls at the telephone it also saves the time and bother of writing and fixing up a notice to callers every time it is desired to leave the office for a time.

We do not wish to confine ourselves to the exact construction and arrangements of parts of the instrument, as it is evident that the principle of our invention may be carried out by a great variety of constructions. Thus, for instance, in making the machines we will likely start all the rows of the pegs *a* from a certain longitudinal line upon the roller *T*, the same as the pegs *h* are arranged. We may also use a greater or smaller number of gear-wheels and bells than shown. The number of rows of the pegs *a* may also be increased, so as to indicate shorter intervals of time than one-fourth of an hour.

It is evident that the signal-instrument may in some cases be hinged to the telephone in such a manner that it may be swung out of the way when not in use, and when required may be swung in such a position that an opening in the case registers with the transmitter of the telephone, or the signal-instrument may be so arranged that it can be hung on a peg near the telephone when not in use, and hung on a peg at the telephone so that it covers the transmitter when it is to be used. By either of those two or by any other suitable arrangements the flexible tube *S*⁴ may be dispensed with.

We are aware, also, that an electric battery or other motive power may take the place of the mainspring *II*, and also that other objects than bells may be used for the hammers to strike upon for producing audible signal blows of different characters; so we do not wish to confine ourselves to the use of bells, although we have in the accompanying drawings illustrated by bells of different sizes the principle of our invention in regard to numbers and characters or difference of the sound of the signal strokes.

We also reserve the right to make some of our instruments to correspond with clocks that show the hours from one to twenty-four upon their dials.

Having thus described our invention, what we claim, and wish to secure by Letters Patent, is—

1. In a return-signal for telephones, the combination of a train of gear-wheels operated by a winding spring and regulated by a rotary fan stopped and started by an electro-magnet, with the roller *T*, provided with pegs and hammers operated thereby upon two bells, said bells being of different sounds, said pegs being so arranged that the one hammer will strike blows for the hours and fractions of hours of a clock and the other hammer will strike one blow for Sunday, two blows for

Monday, three for Tuesday, and so on till it strikes seven blows for Saturday, and means for setting the hammers at any desired day or hour, and means for connecting the action of the electro-magnet with the said striking mechanisms, and means for conducting the sounds of the bells to the transmitter of the telephone, and means for indicating at the outside of the instrument how the inside of it is set, substantially as and for the purpose specified.

2. The combination, with a telephone, of a return-signal device having a train of gear-wheels operated by a winding spring and regulated as to speed by a rotary fan, said train of wheels having connected to it a signal-roller provided with pegs, teeth, or cogs, and hammers or clappers operated thereby for giving audible signal-blows according to the arrangement of the pegs, and means for conducting the sound of the blows to the transmitter of the telephone, and means for starting the signal device by contact with the circuit of the telephone, substantially as described and shown.

3. The combination, with a telephone, of a return-signal device having a spring-operated train of wheels and a signal-roller, the speed of which is regulated by a rotary fan, the said signal-roller having pegs projecting from its surface in rows of such different arrangements that when the roller revolves the pegs will cause the hammers to strike any desired number of blows for signaling the different hours of the day and also to strike blows at shorter intervals for signifying fractions of the hours, and means for setting the hammer in connection with any desired row of said pegs, and means for conducting the sound of the blows to the transmitter of the telephone, substantially as specified.

4. In a return-signal for telephones, the spring-actuated hinged lids *C* and *C'*, having the numerals from 1 to 12 and the marks *i*, the word "In," and the initials of the days of the week upon them, and being provided with the adjustable pointers *V* and *v*, which communicate with the hooks *g*, and the pegs *a* and *h*, also having the hammers *j* and *p*, substantially as and for the purpose specified.

5. The combination of the thumb-screw *Y*, the pointer *V*, the word "In" upon the lid *C*, the hook *g*, and the arm *u* with the rod *v*, having the collars *z* and *z'*, the spring *x*, and the projecting end *y* for stopping the fan *R* when not desired to have the signal device started by the ringing of the telephone, substantially as and for the purpose set forth.

6. In the herein-described return-signal for telephones, the combination of the signal-roller *T*, the wheel *M*, and the cam *L'*, having the notch *L*², with the fan *R*, the lever *H'*, having the two arms *M* and *K'*, the pin *P*², and the anchor *N'*, said lever *H'* being actuated by the electro-magnet *D'*, connected with the circuit of the telephone and controlled by the

spring-actuated lever O' , the pin Q' , and the cam L' , substantially as shown and described.

7. In a call-indicator for telephones, the combination of the dial S^3 , having circularly
5 arranged thereon signs or numerals, as shown, and the pointer or dial-finger T' , indicating upon said numerals or signs the number of times that the telephone has been rung up since the time the pointer was last set upon
10 the lowest sign or "0," with the ratchet-wheel t^3 , the spring-pawl t^4 , the operating-pawl t^5 , and the lever u^2 , operated by the pin u^3 , that

imparts only one motion to the lever u^2 each time the telephone is rung up, substantially as specified, and for the purpose set forth. 15

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

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