



PATENT SPECIFICATION

Application Date: March 15, 1923. No. 7526/23.

216,608

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Complete Accepted: June 5, 1924.

PROVISIONAL SPECIFICATION.

Improvements in Number Dials for Automatic and Semi-automatic Telephone Systems and the like.

We, SIEMENS BROTHERS & Co., LIMITED, of Caxton House, Tothill Street, London, S.W. 1, a company registered under British law, EARL ALEXANDER PETITHORY, of 36, Dartmouth Road, Forest Hill, London, S.E. 23, a citizen of the United States of America, and FRANK BAKER, of 17, Woodland Terrace, Charlton, London, S.E. 7, a British subject, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in number dials for automatic and semi-automatic telephone systems and the like. It has mainly in view improved arrangements for providing a pause during the operation of the dial with a view to allowing the requisite switching and operations by the exchange apparatus to take place between the sending of successive sets of current impulses by the subscriber.

Various arrangements have been proposed with this object in view and examples of this are described in Patent Specifications 14,614/13 and 178,936.

In the present invention springs are provided which short-circuit the usual impulse springs during a portion of the return movement of the dial. To operate these springs the central spindle of the dial is provided with a slipping cam arrangement which is carried along on the setting movement of the dial until further motion is prevented by a limit and when the dial is released by the subscriber to return to normal the cam moves back until it reaches the normal position.

The cam arrangement is so shaped that the short circuiting springs are pressed together during the portion of the return movement of the dial, which portion is preferably the first portion of the return movement, the usual opening and closing of the impulse springs during this portion is therefore ineffective.

A further feature of the invention is the provision of arrangements in a number dial with a "pause" such that only one train of gearing is necessary for driving the interrupter and the centrifugal governor instead of two trains as in the dial described in Specification 14,614/13.

A dial at present proposed as embodying the invention comprises the following parts.

The central spindle has fixed on it the dial plate with also a cup-shaped attachment carrying a pawl. This pawl operates on a ratchet wheel, the said ratchet wheel being an extension of one face of the gear wheel.

The gear wheel is loosely mounted on the outer circumference of the bearing through which the central spindle passes. The gear wheel operates on a pinion mounted on a spindle carrying an interrupter or butterfly disc. The same spindle carries a star wheel which operates on a worm driven centrifugal governor. The interrupter disc is arranged to lift the impulse spring into contact with the other impulse spring twice per revolution.

The central spindle of the dial is controlled by clock spring in the usual manner and has an extension. Fixed on this extension is a cam piece which ensures that the springs short circuiting the impulse springs are in contact when the dial is in its normal position.

Also on the extension is loosely mounted a second cam which is pressed on to the first mentioned cam by a spring washer. The spring washer is screwed on to the end of the extension.

The second mentioned cam has a recessed part terminating in two shoulders. A pin attached to the short-circuiting spring abuts on to this recessed part when the short circuiting springs are in contact. The pin itself serves as a

limit to the movement of the second cam. When the dial is in its normal or unoperated position the pin is not in contact with the main recessed portion but is opposite a further depression. It is, however, prevented from dropping into this depression by the first cam.

When the dial is wound up or set by the subscriber or operator the second cam is carried round with the dial spindle until one shoulder of the main recess reaches the pin when slipping takes place. On the return motion of the dial the second cam is carried with the spindle until the opposite shoulder of the main recess reaches the pin. Thereupon the pin drops into the additional recess and the short circuit is removed by the separation of the short circuiting springs. Impulses are thereupon sent out until the dial reaches its normal position when the first cam lifts the pin out of the additional recess.

Obviously additional safeguards may be provided such as arranging that the pin operated short circuiting spring when it opens the short circuit closes the contact in the subscribers' loop.

Furthermore, the pause due to the operation of the slipping cam may take place in the end portion of the return movement of the dial instead of in the first portion.

Dated this 15th day of March, 1923.

SIEMENS BROTHERS & Co.,
LIMITED.

The common seal of Siemens Brothers & Co. Limited, was hereto affixed by order of the Board:—

WILLIAM O. SMITH,
Director,

W. WHEELER,
Secretary,

For Selves and Co-applicants.

COMPLETE SPECIFICATION.

Improvements in Number Dials for Automatic and Semi-automatic Telephone Systems and the like.

We, SIEMENS BROTHERS & COMPANY, LIMITED, of Caxton House, Tothill Street, London, S.W. 1, a company registered under British law, EARL ALEXANDER PETITHORY, of 36, Dartmouth Road, Forest Hill, London, S.E. 23, a citizen of the United States of America, and FRANK BAKER, of 17, Woodland Terrace, Charlton, London, S.E. 7, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to improvements in dials for transmitting impulses to operate switches of automatic and semi-automatic telephone systems and the like. The improved dial forming the subject of this specification is provided with spring contacts for short circuiting the impulse springs, such contacts maintaining the short circuit during the first part of the return movement of the dial to prevent the transmission of impulses. To operate the said spring contacts a slipping cam arrangement fitted on the finger plate spindle is so arranged that the setting movement of the dial rotates said cam to a limit stop which prevents further motion until the dial is released by the subscriber to return to normal. The cam then moves back until it reaches the normal position and during its displacement from its

normal position the short circuiting spring contact maintains its contact across the impulse springs, the short circuit being then removed to allow transmission of impulses till dial comes to normal.

One embodiment of the invention is shown in the accompanying drawings in which:—

Fig. 1 is a sectional elevation of the dial taken along the line 1—1 of Fig. 2.

Fig. 2 is a plan of the back of the dial.

Fig. 3 depicts the shape of cam T.

The finger plate A by which the subscriber calls the desired number is attached to a plate or dish-shaped piece B which in turn is secured to the spindle C rotating in a bearing D. The case S² houses a clock spring, one end of which is attached to the spindle C and the other end attached to the case S² so that the spindle and the parts of the dial attached thereto are returned to the normal position when the finger plate A is released by the subscriber after setting the dial.

A pawl E attached to the plate B is acted on by a spring to keep it in contact with the ratchet F to which is rigidly attached the gear wheel G mounted to revolve on the outside of the fixed bearing D and supported thereon by the collar D¹. The teeth of the ratchet wheel F are so shaped that the pawl slides over them when the dial is turned in a clockwise direction but when the

finger plate under tension of the spring S¹ rotates in an anticlockwise direction in returning to normal, the pawl E is sprung into engagement with the teeth and rotates the ratchet F and gear wheel G.

A pinion H meshes with the gear wheel G and is rotated thereby. Fastened to the spindle of the pinion H which spindle is mounted in bearings J and K is a star wheel L meshing with a worm gear M and also a cam piece P co-operating with a spring R. The governor mechanism N of well known construction is mounted on a spindle carrying the worm gear M and is therefore rotated by means of the star wheel L when the pinion H is rotated by the gear wheel G. The "butterfly" cam piece P, which is also rotated when the pinion H rotates, is provided with projecting wings which engage the under surface (see Fig. 2) of spring R to force it into contact with the upper spring S so that springs R and S make contact twice for each revolution of the spindle carrying pinion H.

The springs R and S are connected at the mounting V to spring contacts X and Y respectively. The spring X is "U" shaped to give the required resiliency in the restricted space, and this spring in its normal position as shown in Fig. 2 makes contact at its end with the spring contact Y. When spring X is allowed to operate it breaks contact with Y and makes contact with spring Z which provides for shunting the receiver and transmitter while the impulses are being transmitted.

To operate spring X an extension pin X¹ is attached thereto which is adapted to ride on the edge of both cam pieces T and W and when extension pin X¹ is allowed to spring into the groove W², spring X will break contact with Y and make with contact Z. The delayed action of the transmission of impulses when dialling a number is provided for by the action of cams T and W. Cam T of the shape shown in Fig. 3 is rigidly secured to the spindle C against a shoulder C¹ so that it rotates with the finger plate A. Cam W is loosely fitted on the end of spindle C against a shoulder C² and is pressed against this shoulder by the spring washer SW which is fastened to the spindle C by a screw, so that the cam W is in frictional engagement with the rotatable spindle C and cam piece T. A peripheral recess as depicted in Fig. 2 with a shoulder W¹ at one end, and a further recess W², to accommodate the extension pin X¹, is provided in the said cam piece W.

A, better understanding of the reason for the particular shape of these cam

pieces will be obtained from a description of their operation when a number is dialled.

Looking from the back of the dial as shown in Fig. 2 the subscriber would turn the finger plate A in an anti-clockwise direction and spindle C would carry with it the cam pieces T and W, the extension pin X¹ riding first on cam T, and when past the depression W² on cam W. When the shoulder W¹ engages the pin X¹ the cam piece W is stopped from rotating further, and it slides around the spindle C which continues till the subscriber has pulled the dial to the finger stop. During this motion the pawl E slides over the teeth of the ratchet F. When the subscriber releases the dial the moved parts, under the action of spring S¹, commence to return to normal. The pawl E engages a tooth of ratchet F and carries the gear G with it, thus operating the governor N and cam P. The cam piece W is carried around by the spindle C, and the pin X¹ riding on the outside of the recess maintains the contact between contacts X and Y so that though the impulse spring R is operated by the cam P no impulses are sent to line for the time taken for the dial to rotate through the angular distance between the shoulder W¹ and the corresponding shoulder of W². When cam W has rotated to the position shown in Fig. 2 the pin X¹ springs into the depression W² since the shoulder T¹ (see Fig. 3) is now displaced from its normal position where it holds X¹ out of the depression W². Cam W is held in its normal position by the pin X¹ which has allowed spring X to break contact with contact Y thus making the impulses effective and to make contact with Z to shunt the receiver and transmitter. This condition continues until just before normal dial position is reached when the shoulder T¹ of cam T lifts the pin X¹ from the depression W² and all parts are returned to normal. It will be understood that the period of lost motion, *i.e.* the period during which the impulse springs are short circuited, or the number of impulses which are so rendered ineffective, is regulated by the extent of the recess ending in the shoulder W¹ and the fitting of the cam piece P.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:--

1. In a number dial for automatic or semi-automatic telephone systems and the like, provided with spring contacts normally short-circuiting the impulse

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5 springs, arrangements for operating said
spring contacts to remove the short cir-
cuit, when, after setting the dial, it has
moved a prescribed distance in its return
to normal, thereby allowing of the trans-
mission of impulses.

10 2. In a number dial of the type claimed
in Claim 1, a slipping cam arrangement
in frictional relationship with the finger
plate spindle, said cam maintaining a
short circuiting contact spring on its
contact for the period during which it is
desired to render the make and break of
the impulse springs ineffective.

15 3. In a number dial of the type
claimed in Claim 2 a second cam which
operates to close said short circuiting

spring contacts when the train of
impulses is completed.

4. A number dial substantially as 20
described in the specification and shown
in the accompanying drawings.

Dated this 15th day of December, 1923.

SIEMENS BROTHERS & Co.,
LIMITED.

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The common seal of Siemens
Brothers & Co. Limited, was
hereto affixed by order of the
Board:—

G. CHAUVIN,
Director,

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W. WHEELER,
Secretary,

For Selves and Co-applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

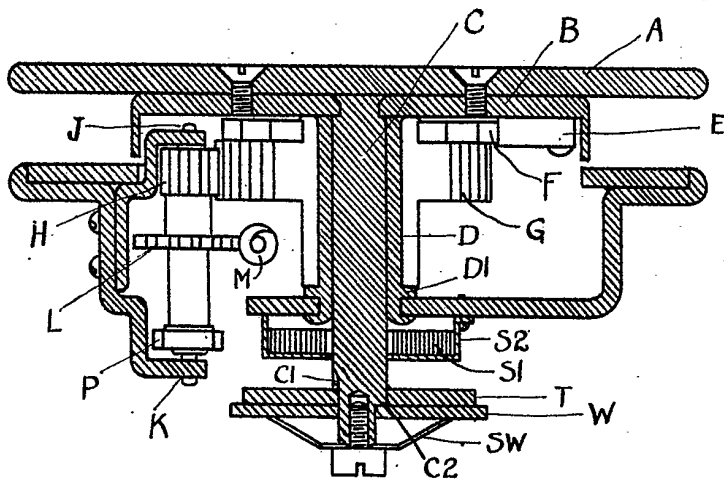


FIG. 1

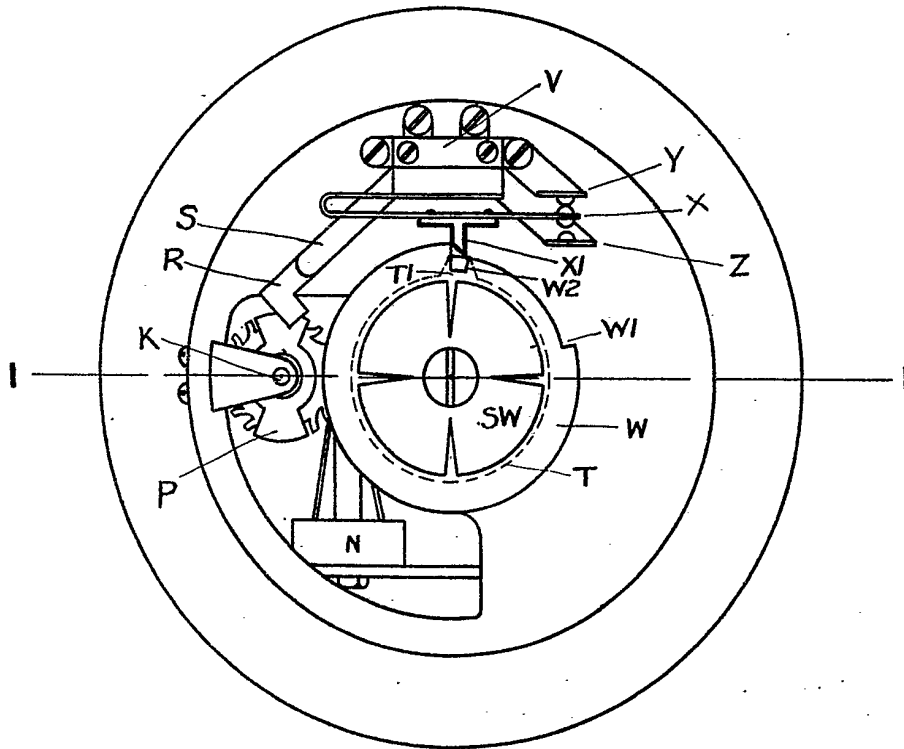


FIG. 2

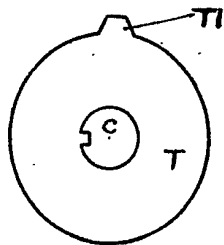


FIG. 3