

March 4, 1947.

R. E. HERSEY

2,416,692

IMPULSE TRANSMITTER

Filed Sept. 11, 1945

FIG. 1

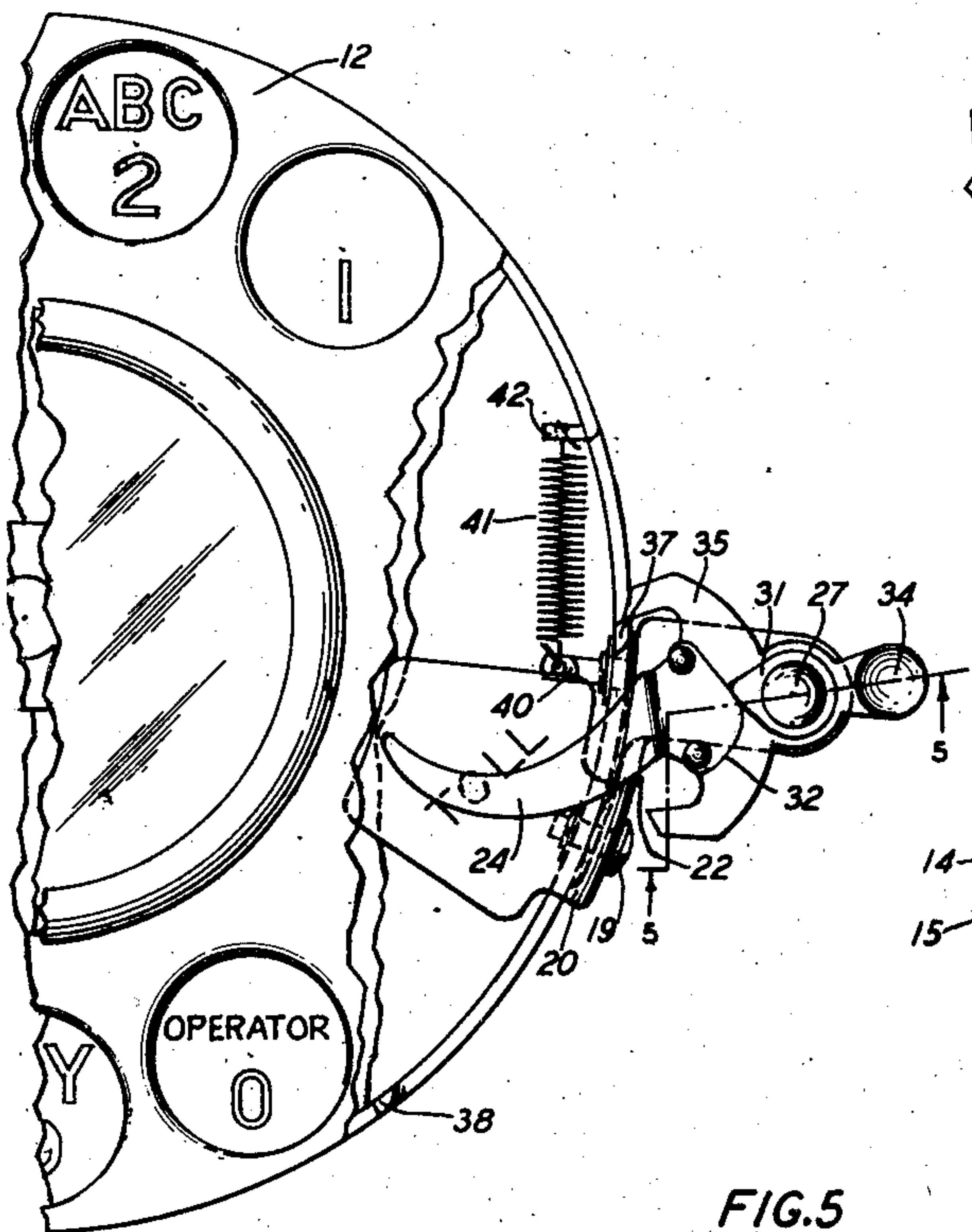


FIG. 2

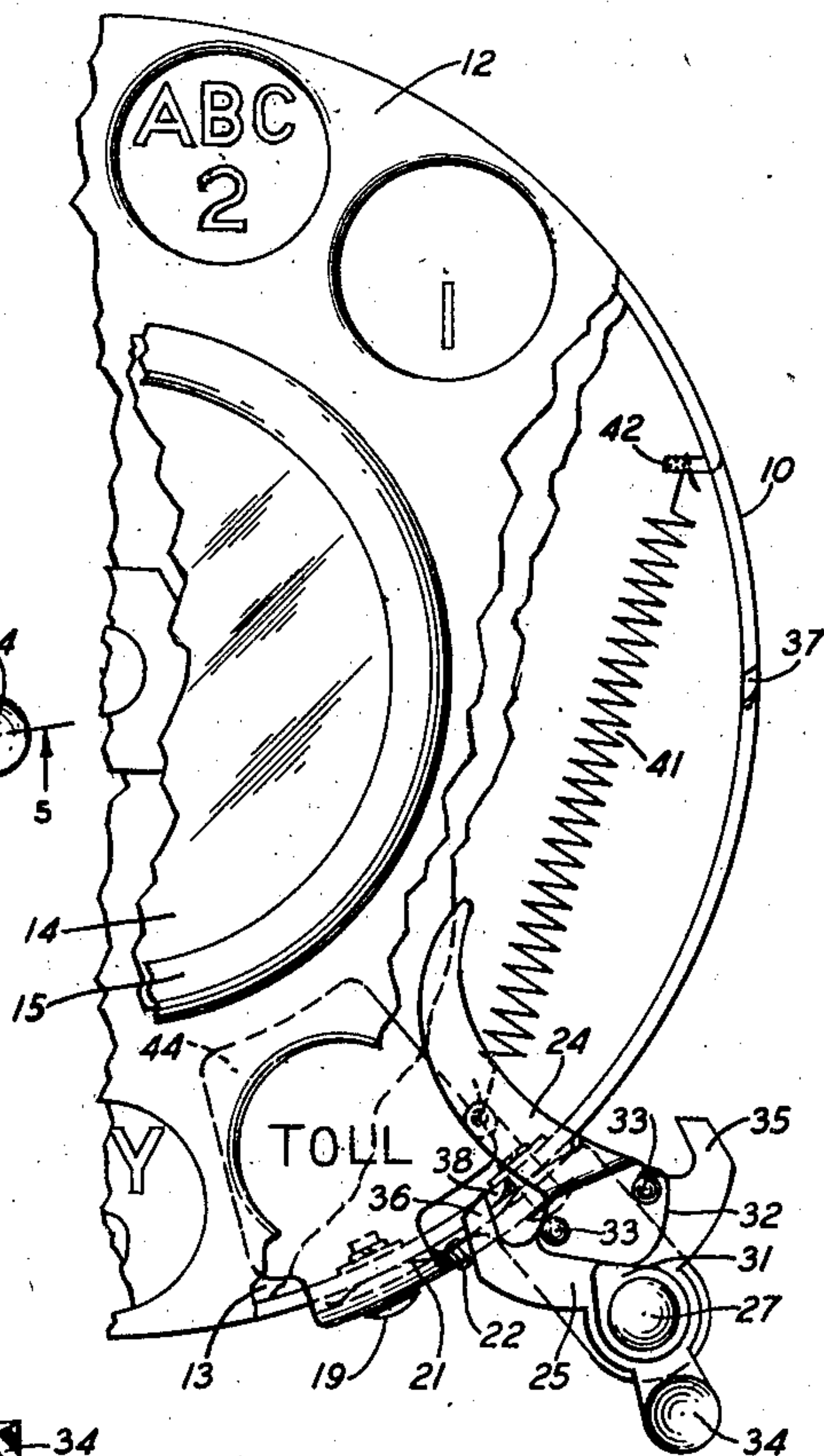


FIG. 5

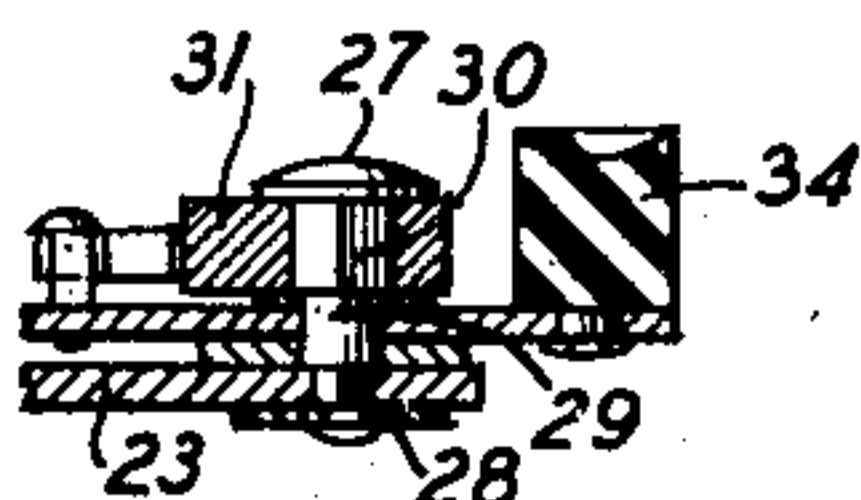


FIG. 3

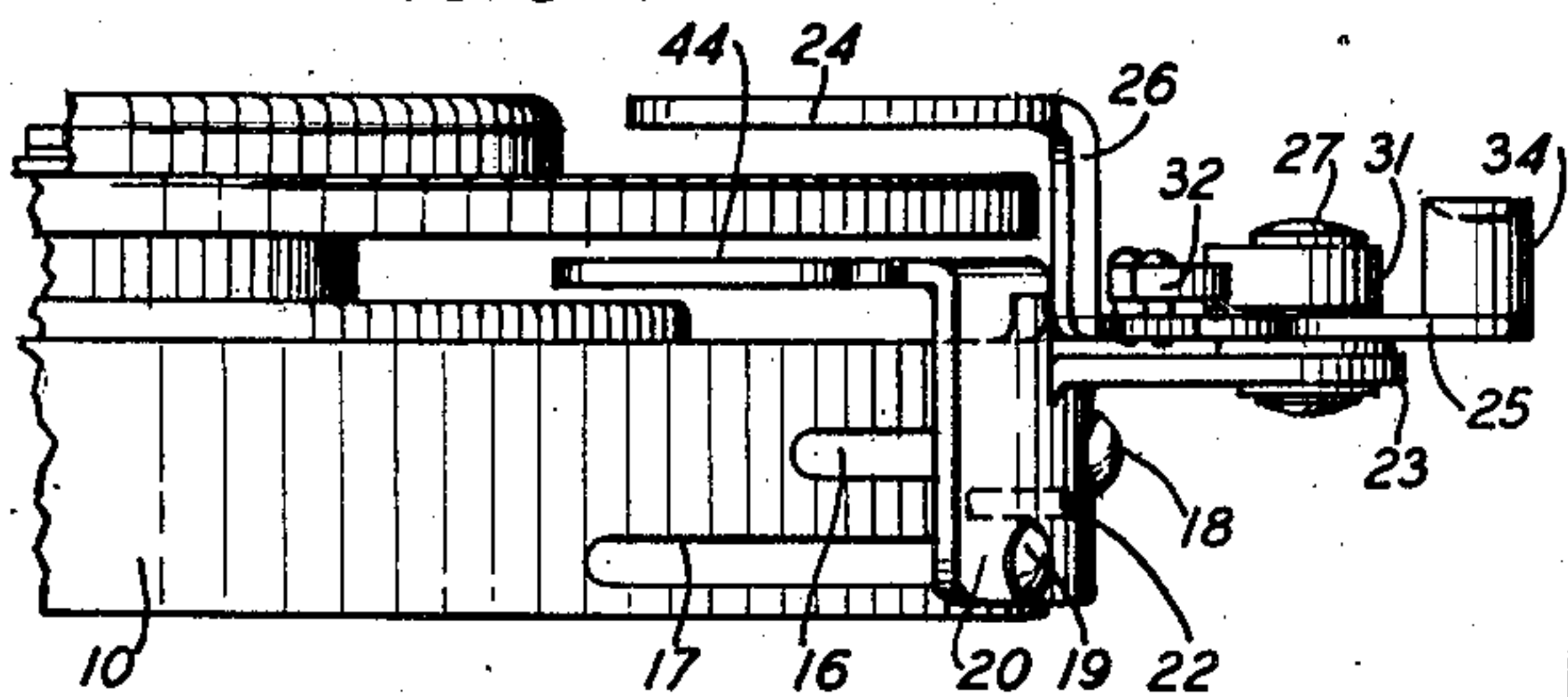
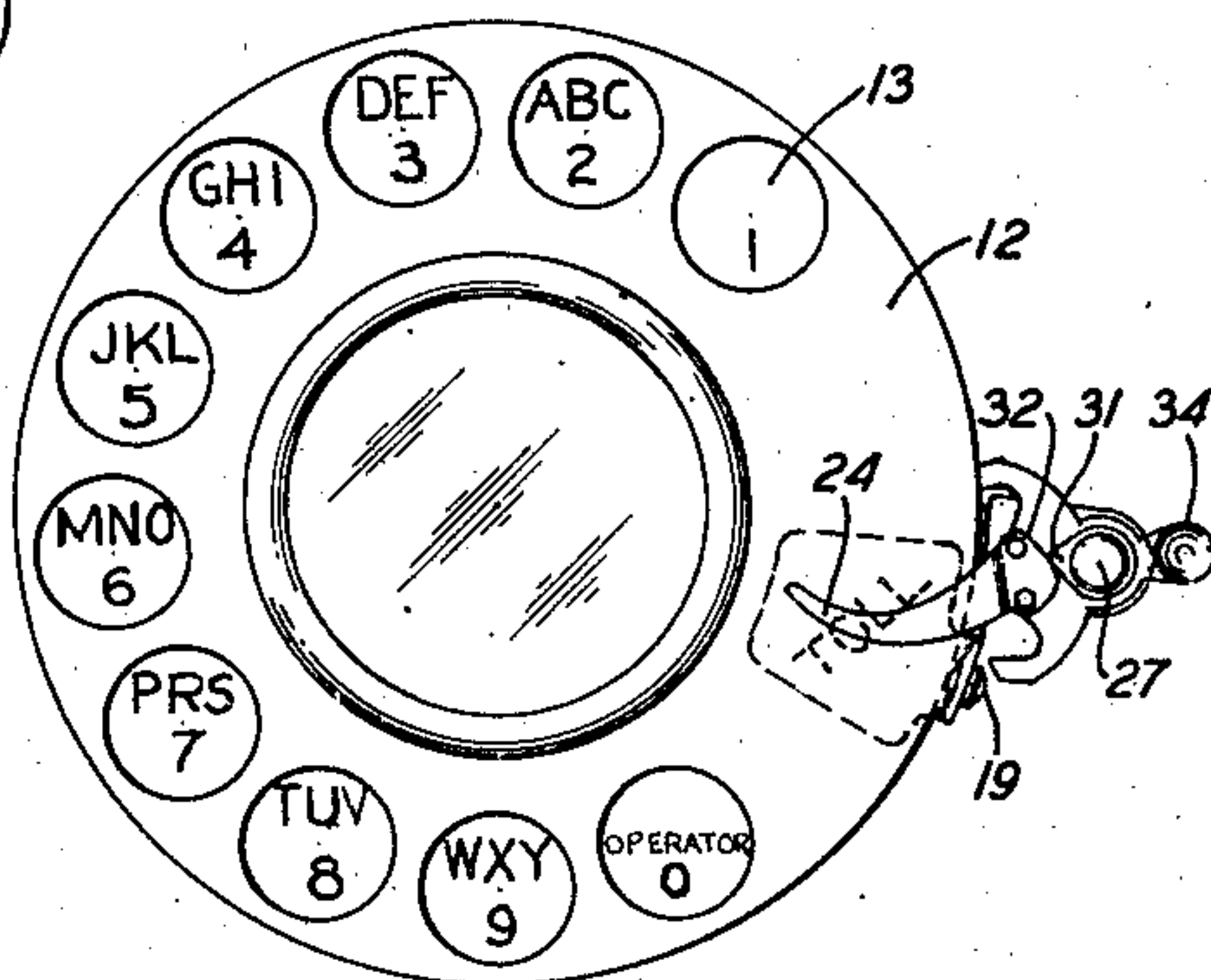


FIG. 4



INVENTOR
R. E. HERSEY

BY

G. F. Kane

ATTORNEY

UNITED STATES PATENT OFFICE

2,416,692

IMPULSE TRANSMITTER

Ralph E. Hersey, Madison, N. J., assignor to
Bell Telephone Laboratories, Incorporated, New
York, N. Y., a corporation of New York

Application September 11, 1945, Serial No. 615,539

7 Claims. (Cl. 179—90)

1

This invention relates to telephone dials and particularly to a telephone dial which is suitable for use at a subscriber's station for dialing telephone toll calls.

In accordance with present day practice a telephone toll call initiated at a subscriber's station is completed under the control of a so-called "long distance" operator. To initiate such a call, the subscriber dials "Zero" and reaches the "Zero" operator, or dials 211 and reaches the "long distance" operator. In either case the subscriber passes the details of the desired connection to the answering operator who then proceeds, in the well-known manner, to have the call extended to the desired destination.

In order to preclude the necessity for the intervention, or assistance of the exchange operators in the completion of toll calls originated at a subscriber's station and to otherwise expedite the completion of such calls, it has been proposed to provide facilities whereby a calling subscriber, through the sole medium of the dial located at the subscriber's station, may originate and control the completion of toll connections directly and without having to rely upon the services of the exchange operators. In order that the exchange switching equipment be enabled to distinguish between local and toll calls originated at the subscriber's station, it is proposed to characterize the toll call designation by an extra digit, such as "eleven," which digit supplements the usual station designation. To provide for the transmission of such a toll identification digit the subscriber's telephone dial must be equipped to do so. Furthermore, it is essential that the calling subscriber must be made fully aware of the fact that a toll call is being originated, lest the careless or accidental manipulation of the dial results in the completion of a toll call when only a local call was intended. In other words, the subscriber must be called upon to perform some deliberate act in originating a toll call, which act is not required of the subscriber in initiating a local call.

It is the object of this invention to provide a subscriber's telephone dial which may be utilized to transmit a toll identification signal, and which requires a deliberate act by the subscriber to condition the dial for the transmission of such a signal.

2

This object is attained in accordance with a feature of the invention by utilizing in a telephone dial, a standard ten-hole finger-wheel by means of which the dial may be variably set to effect the transmission of the usual ten groups of dial pulses and by the incorporation, in the dial structure, of a two-position finger-stop and means for causing the finger-stop to be set in either position. The two finger-stop positions may be defined as normal and alternate, or toll positions. In the normal position of the finger-stop the finger holes of the finger-stop are so spaced, in a counter-clockwise direction, from the finger-stop that when the finger-wheel is rotated in a clockwise direction towards the finger-stop the dial will be set to transmit the number of pulses corresponding to the digital characterization assigned to the finger holes, that is, when the No. 1 finger hole is employed to set the dial, the dial will function, upon release of the finger-wheel, to transmit one dial pulse; when the No. 2 finger hole is employed to set the dial, the dial will function, upon release of the finger-wheel, to transmit two dial pulses, and so on. In the alternate position of the finger-stop the spacing of the finger holes of the finger-wheel relative to the finger-stop is increased to such an extent that when the dial is set from any finger hole the number of dial pulses transmitted upon release of the finger-wheel is increased by one pulse. For example, when the dial is set from the "zero" hole of the finger-wheel, eleven instead of the usual ten dial pulses will be transmitted when the finger-wheel is released. Similarly, setting the dial from the No. 1 finger hole would cause the transmission of two dial pulses; setting the dial from the No. 2 finger hole would cause the transmission of three dial pulses, and so on.

The movable finger-stop of this invention is mounted as a toggle upon a carriage slidably supported on the wall of the dial casing and is provided with means for accurately and positively locating the stop in either of its two positions. The finger-stop is provided also with manually operable means for disengaging the stop from its normal position and for moving it to its alternate position when the dial is to be used for the initiation of a toll connection. The design is also such that when the finger element or stop is engaged by the finger of the dial operator when in

3

its alternate position, the stop is disengaged from its alternate position and automatically restored to its normal position. The carriage, through the medium of a masking portion integral therewith, serves, in its alternate position, to obscure the number plate designation associated with the "zero" hole of the finger-wheel and to present for observation through such hole the designation "toll."

These and other features of the invention will be better understood from the following detailed description when read in connection with the accompanying drawing, in which:

Fig. 1 is a fragmentary plan view of a standard telephone dial modified to include the movable finger-stop. In this view, which illustrates the finger-stop in its normal position, portions of the finger-wheel and number plate are broken away in order to expose those elements of the finger-stop mechanism which are located below the number plate and project through the dial casing;

Fig. 2 is a view of the dial corresponding to Fig. 1 and shows the finger-stop in its alternate, or toll position;

Fig. 3 is a side elevation of the dial shown in Fig. 1;

Fig. 4 is a plan view of the complete dial and illustrates the movable finger-stop in its normal position; and

Fig. 5 is a detail sectional view illustrating the manner in which the movable finger-stop is mounted on the slidable carriage.

The dial illustrated in the drawings is a standard dial of well-known design and consists essentially of a cup-shaped casing 10; a finger-wheel 12 mounted for rotation in the usual manner and located in superposed relation to the fixed number plate 13; a designation card window 14 and clamping ring 15. The manner in which these elements of the dial are assembled on the dial structure is well known.

The wall of the dial casing 10 is provided with two slots 16 and 17 which are of the same length and are arranged in staggered relation. These slots accommodate two pins 18 and 19 for sliding movement therein, the said pins constituting supports for the carriage member 20. A flat spring 21 is riveted at 22 to the carriage 20 at a point substantially mid-way of the pins 18 and 19 and is bowed towards the casing wall on each side of the rivet 22. The spring provides means for precluding any undue wobble of the carriage as do also the double slot and pin combination.

The carriage 20 is provided with an integral projecting arm 23 upon which the finger-stop is mounted, which finger-stop comprises the finger engageable portion 24, a finger grip supporting portion 25 and an intermediate leg 26 which interconnects the portions 24 and 25. The finger-stop is mounted on the projecting arm 23 of the carriage 20 by means of a rivet 27 the shank portion of which is square-sectioned at either end and cylindrically formed at its intermediate portion. The lower squared section 28 fits into a similarly configured hole in the carriage arm 23 so as to be fixed against rotation relative thereto. The cylindrical portion 29 of the rivet shank passes through a cylindrical hole in the portion 25 of the finger-stop thereby providing a bearing on which the finger-stop may be rotated relative to the carriage 20. The upper squared section 30 of the rivet shank accommodates a cam 31, the registering hole in the cam being also square so that the cam is immovably supported on the rivet and is maintained in fixed

4

position relative to the carriage 20. Suitable washers complete the finger-stop and cam assembly. A finger grip or button 34 is mounted at the outer extremity of the finger-stop portion 25.

The carriage 20 is also provided with an inwardly projecting arm 44 which bears the designation "Toll." The carriage arm 44 constitutes a mask which is movable with the carriage between the number plate 13 and the finger-wheel 12, and when the carriage is in its normal position the mask is obscured from view by the solid portion of the finger-wheel. When the carriage is moved to its alternate position the mask is interposed between the number plate designation "Operator 0" and the corresponding finger hole so that the designation "Toll" becomes visible through such hole.

A light flat spring 32 has each end thereof wrapped around and fixed to a rivet 33 carried by the finger-stop, the spring being bowed outwardly in the direction of the cam 31. The function of this spring will be indicated in a subsequent description.

Projecting inwardly from the finger-stop portion 25 and integrally formed therewith are two tooth-like elements 35 and 36, which, as will be described presently, cooperate with two protuberances 37 and 38 formed on the casing wall 10 in effectively locking the finger-stop in its normal and alternate positions, respectively.

The pin 18 projects inwardly through a suitable hole in the dial casing, and terminates in a terminal 40 to which one end of a restoring spring 41 is fixed, the other end of the spring 41 being fixed to a tab 42 projecting inwardly from the casing 10. The inner portion of the pin 19 also projects through a suitable hole in the casing wall and both pins 18 and 19 accommodate suitable washers and lock rings which serve to preclude the pins falling out of their respective holes.

In its normal condition the finger-stop occupies the position illustrated in Figs. 1, 3 and 4. In this position the projection 35 is in engagement with the protuberance 37 and the action of the toggle spring 32 on the cam 31 tends to maintain the finger-stop in this position so that the finger-stop is effectively locked in its normal position. With the finger-stop in this position the finger-wheel 12 may be rotated by inserting the finger into any of the finger holes, and then moving the finger clockwise in an arcuate path until it engages the finger element 24 of the stop. Upon withdrawal of the finger at this point the finger-wheel restores to normal in the well-known manner to cause the dial to transmit a series of impulses corresponding in number to the designation of the finger hole used in setting the dial. It will be observed that the engagement of the finger with the finger-stop at this time does not disturb the normal setting of the finger-stop but, if anything, tends to emphasize the locking of the finger-stop in its normal position.

When the dial is to be used to originate a toll call the button 34 is grasped by the subscriber and moved in clockwise direction so that the finger-stop rotates about the rivet 27 causing the withdrawal of the locking tooth 35 from its latching engagement with the protuberance 37, thereby freeing the carriage 20 for movement. As the subscriber continues to pull on the hand grip 34 the carriage slides on its support towards the position it occupies in Fig. 2. Due to the initial

5

rotational movement of the finger stop about the rivet 27 the spring 32 is forced to ride on the stationary cam 31 so that it assumes the position illustrated in Fig. 2. The action of the spring and cam is a toggle action so that the finger-stop actually snaps into its alternate position relative to the cam 31 and is held in this position by the action of the toggle spring 32 on the cam 31. As the carriage moves towards its alternate position the tooth-like projection 36 of the finger-stop slides over the latching protuberance 33 and locks in the position illustrated in Fig. 2. The restoring spring 41 distends due to the movement of the carriage 20 to its alternate position and builds up a sufficient tension to cause the restoration of the carriage to its normal position when the tooth-like projection 36 is withdrawn from behind the protuberance 38 as will be described presently. In the alternate position of the carriage 20, the mask 44 occupies a position in which the designation "Toll" carried thereby is visible through the "zero" hole of the finger-wheel.

It is to be understood that the toggle spring 32 exerts a greater force than the spring 41 in the alternate position of the finger-stop in order to preclude the possibility of the spring 41 overcoming the locking tension of the toggle spring. When the finger stop is in its alternate position its spacing from the finger holes of the dial finger-wheel has been increased, measured in a clockwise direction, by the distance between any two adjacent finger holes so that an extra pulse is transmittable by the dial when set from any of the finger holes. For example, setting the dial from the "zero" finger hole results in the transmission of eleven pulses instead of the usual ten. When the subscriber inserts the finger into the "zero" hole which is now designated "Toll" and then moves the finger in an arcuate clockwise direction, the finger, at the end of its travel, engages the finger element 24 of the finger-stop causing the finger-stop to rotate counter-clockwise sufficiently to cause the latching tooth 36 to be disengaged from the protuberance 38. The stationary cam 31 acts upon the toggle spring 32 during this movement to cause the finger-stop to snap over to its normal position. When the tooth 36 is withdrawn from its latching position the tension of the spring 41 exerts sufficient force on the carriage pin 18 to cause the carriage 20 to be pulled back to normal position. The toggle tooth 35 then latches the finger-stop to the protuberance 37. The finger-stop is thus automatically restored to its normal position.

What is claimed is:

1. In a telephone dial, the combination of a dial casing, a finger-stop, and means for mounting said finger-stop on said casing comprising a carriage slidably supported on said casing, means for mounting said finger-stop on said carriage, and manually engageable means fixed to said finger-stop by means of which said carriage may be moved on its support relative to said casing.

2. In a telephone dial, the combination of a dial casing, a finger-stop, and means for mounting said finger-stop on said casing comprising a carriage supported on said casing for slidable movement relative thereto between normal and alternate positions, means pivotally mounting said finger-stop on said carriage, means latching said finger-stop to said casing in the normal position of said carriage, and manually controllable means for pivoting said finger-stop to an unlatched condition and for moving said carriage to its alternate position.

6

3. In a telephone dial, a dial casing, a finger-stop slidably mounted on said casing and having normal and alternate positions, said finger-stop having a portion thereof engageable by the finger of a dial operator when setting said dial, means for latching said finger-stop in its alternate position, and means responsive to the engagement of the finger of the dial operator with the said finger engageable portion of said finger-stop for moving said finger-stop from its alternate position to its normal position.

4. In a telephone dial, the combination of a dial casing, a finger-wheel mounted for rotation relative to said dial casing, a finger-stop for determining the extent of rotation of said finger-wheel when the finger of the dial operator is inserted in a finger hole thereof and moved in an arcuate path in one direction towards said finger-stop, said finger-stop having normal and alternate positions relative to said casing, means for latching said finger-stop in its normal position, and manually operable means for unlatching said finger-stop and for moving it to its alternate position.

5. In a telephone dial, the combination of a dial casing, a finger-wheel mounted for rotation relative to said dial casing, said finger-wheel being rotatable by the finger of a dial operator when moved in an arcuate path while engaged in a finger hole of said finger-wheel, a finger-stop engageable by the finger of the dial operator in rotating said finger-wheel whereby the extent to which the finger-wheel may be rotated from any finger hole is determined, and means for movably mounting said finger-stop on said casing comprising a carriage, supports for said carriage slidably in slots in said casing, means for pivotally mounting said finger-stop on said carriage, and manually operable means for pivoting said finger-stop on said carriage and for moving said carriage on said supports whereby the position of said finger-stop relative to a particular point on said casing may be varied.

6. In a telephone dial, the combination of a dial casing, a finger-stop, a finger-wheel mounted for rotation relative to said casing, said finger-wheel being rotatable by the finger of a dial operator when moved in an arcuate path while engaged in a finger hole thereof, a finger-stop including a finger engageable portion projecting into the arcuate path traversed by the operator's finger in rotating said finger-wheel, a carriage, means slidably supporting said carriage on said casing whereby said carriage is movable between normal and alternate positions, manually operable means for moving said carriage from its normal position to its alternate position, means for latching said carriage in its alternate position, means including the finger engageable portion of said finger-stop and operable by the finger of the dial operator when rotating said finger-wheel for unlatching said carriage in its alternate position, and means effective automatically upon the unlatching of said carriage for returning said carriage to its normal position.

7. In a telephone dial, the combination of a dial casing, a finger-stop movably mounted on said casing and adapted to occupy normal and alternate positions, a rotatable finger-wheel having a plurality of finger holes by means of which the finger-wheel may be variably set to condition the dial to transmit different numbers of pulses when the finger of the dial operator is inserted in the finger holes of the finger-wheel and moved in an arcuate path towards said finger-stop, said fin-

ger-stop when in its normal position limiting to a predetermined number the pulses transmittable by the dial when set from any finger hole, and when in its alternate position increasing by one pulse the number of pulses transmittable by the dial when set from any finger hole, and manually operable means for moving said finger-stop from one position to the other position.

RALPH E. HERSEY.

5

10

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,556,905	Blessing -----	Oct. 13, 1925
1,609,983	Blessing -----	Dec. 7, 1926
2,320,401	Beizer -----	June 1, 1943
1,096,841	Kaisling -----	May 19, 1914