Sept. 26, 1961 K. FÜGLISTER 3,001,705

IMPULSE COUNTER

Filed March 14, 1956

FIG. 1

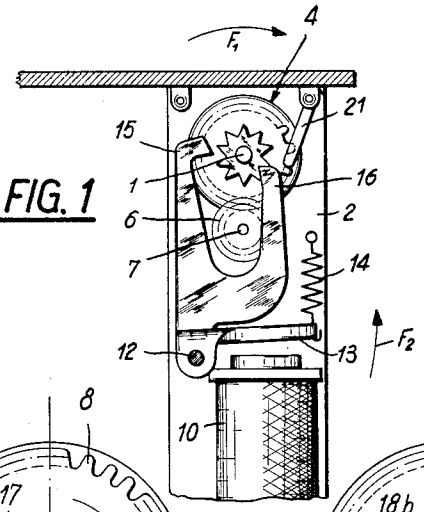


FIG. 2

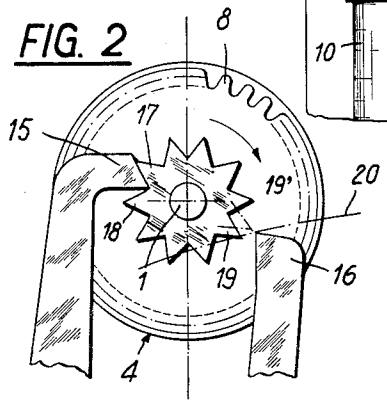


FIG. 3

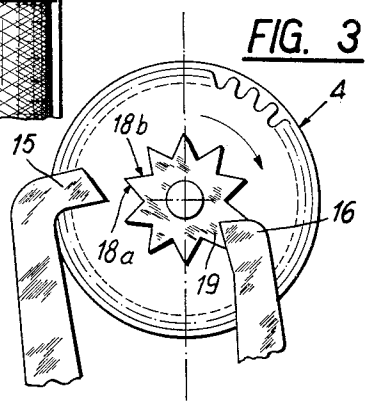


FIG. 4

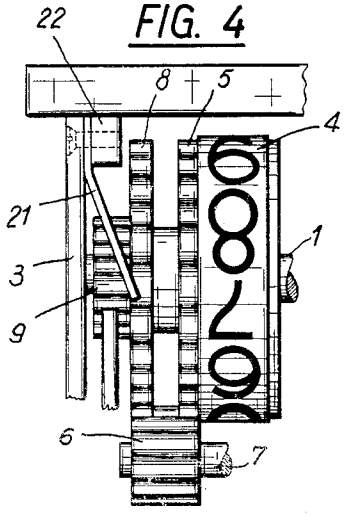
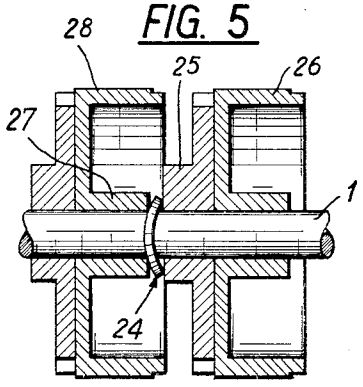


FIG. 5



Inventor:
Karl Füglister
by: J. Orlatti-Segny
Attorney

United States Patent Office 3,001,705 Patented Sept. 26, 1961

3,001,705

IMPULSE COUNTER

Karl Füglister, Geneva, Switzerland, assignor to Sodeco, Societe des Compteurs de Geneve, Geneva, Switzerland

Filed Mar. 14, 1956, Ser. No. 571,403
Claims priority, application Switzerland Mar. 15, 1955
1 Claim. (Cl. 235—131)

In certain types of impulse counters which serve in particular for the recording of tariff-charges for telephone calls through a number of digit-carrying drums corresponding to the successive decimal orders and associated with pinions for the transfer of the successive figures to be carried over, said pinions being supported by a common rocker member, a power unit controls the unit drum to make it progress intermittently through one half pitch.

Such prior power units include generally an electromagnet which draws inwardly and then releases at each counting impulse a blade connected with a rocking control lever the arms of which extend to either side of a star-shaped member coaxially rigid with a primary toothed wheel; the latter meshes with a unit pinion meshing in its turn with the peripheral teeth provided on one side of the unit-recording drum, the two arms of said lever being adapted to shift in succession through one half pitch the star-shaped member and the primary toothed wheel during the corresponding half-oscillation of the lever produced by the power unit. In such known impulse counters, if the rhythm is rapid, whenever the operative tip of the first arm of the rocking lever moves away from the bottom of the interval separating two successive points of the star-shaped member as provided by the breaking of the electromagnet energizing current, it may occur that the star-shaped member and the primary toothed wheel after impinging against the unit pinion so as to drive it through one half tooth interval execute a slight receding movement as a result of this impact. As a consequence of this receding movement, one of the points of the star-shaped member which should be subjected to the impulse of the operative tip of the second arm of the rocking lever for executing the second half of the annular shifting through one tenth of a revolution, since the unit drum is being involved, is now outside the path of said operative tip so that it is no longer subjected to the mechanical impulse required. The operative tip of the first arm of the lever at the moment of the following energization of the electro-magnet no longer impinges on the proper side of an arm of the star-shaped member and impinges instead on the opposite side so as to produce a rearward motion of the unit drum through one half pitch. The recording of the impulses is therefore erroneous.

My invention has for its object to remove this drawback and it covers an impulse counter of the type referred to, wherein at least one braking spring is located in a manner such as will prevent any possible rearward movement of the star-shaped member and of the primary toothed wheel after the end of any half oscillation as a consequence of the clearance required between the unit pinion of the gear on the one hand and the primary toothed wheel and the teeth of the unit drum on the other hand.

Accompanying drawings illustrate by way of example two preferred embodiments of the invention. In said drawings:

FIG. 1 is a elevational view of a first embodiment seen endwise in a plane perpendicular to the axis of the digit-carrying drums.

FIGS. 2 and 3 are detail elevational views on a larger scale corresponding to FIG. 1 at two different moments of operation.

FIG. 4 is a partial lateral elevational view of this first embodiment.

FIG. 5 is a partial simplified diametrical cross-section of a second embodiment.

In the first embodiment illustrated, the common shaft **1** for the digit-carrying drum is carried by two bearings formed in the terminal plates or uprights **2** and **3** of the frame. Only one digit-carrying drum **4** has been illustrated, which drum is provided for the recording of units. Said drum is provided with a peripheral series of teeth **5** meshing with the unit pinion **6**, which latter is mounted loose on a spindle **7** carried by a rocking member which is not illustrated. The other transfer pinions serving for carrying over the successive drums corresponding to the successive decimal orders are also carried by the spindle **7**.

The unit pinion **6** meshes also with the primary wheel **8** carrying twenty teeth and which is coaxially rigid with a star-shaped member **9** carrying ten points or projections (FIG. 4). The gear **8—9** is mounted loose on the drum shaft **1**.

The power unit for the impulse counter is constituted by an electromagnet **10** which is periodically energized through the impulses of the counting current and is associated with a rocking lever L pivotally secured to a spindle **12**, said lever being rigid with a blade of magnetic metal **13** urged away from the electromagnet by a return spring **14**. Said rocking lever includes two arms ending each with an operative point **15** or **16** adapted to cooperate with the teeth of the star-shaped member **9**.

When a counting current impulse energizes the electromagnet **10**, the latter attracts the blade **13** and the lever L rocks in the direction of the arrow F1. The operative tip **15** of said lever pushes then the tooth **17** of the star-shaped member **9** and carries the latter along in the direction of the arrow F3 until the said tip **15** reaches the bottom of the recess or interval between the star points **17** and **18** as clearly shown in FIG. 2. From this moment onwards, the current energizing the electromagnet **10** is switched off and the spring **14** urges the blade **13** back in the direction of arrow F2 which leads to a corresponding shifting of the lever L in the same direction. Consequently the second operative tip **16** of the lever will act normally on the tooth **19** of the star-shaped member **9** which is thus shifted together with the primary toothed wheel **8** through one half pitch. Simultaneously the first operative tip **15** of the lever moves out of the recess between the two teeth **17** and **18** of the star-shaped member. It may occur that the unit constituted by the latter and by the wheel **8** abuts against the unit pinion **6** and is subjected consequently to a slight receding motion as a result of such an impact. This receding movement constrains the point **19** on the star-shaped member to occupy the position illustrated in dot-and-dash lines **19'** in FIG. 2, instead of remaining in the position illustrated in solid lines. Consequently, said point no longer lies in the path **20** followed by the second operative tip **16** of the rocking lever L under the action of the return spring **14**. The star-shaped member **9** is consequently no longer subjected to the mechanical impulse required for operation and the operative tip **15** on the first lever arm will at the moment of the following energization of the electromagnet impinge against the side **18*b*** of the tooth **18** of the star-shaped member instead of against the other side **18*a*** as should normally occur (compare FIGS. 2 and 3). Consequently, the star-shaped member **9** moves rearwardly through one half pitch and the impulse is not accurately recorded.

Now, according to the present invention, this risk of an erroneous counting is cut out through a braking spring **21** secured through a screw and a nut **22** to the plate **3** of the frame (FIG. 4). Said spring engages laterally the

primary toothed wheel **8** and its free end engages the interval between two successive teeth on the latter. The spring **21** brakes thus the system **8—9** and prevents it from receding as a consequence of an impact against the pinion **6** or of a recoil movement of the latter after one of its teeth has impinged against the teeth **5** on the first or unit-recording drum on the shaft **7**. This recoil of the pinion **6** may occur as a consequence of the clearance which is required in the gear between the parts **5** and **6** on the one hand and between the parts **6** and **8** on the other hand.

The braking spring **21** constrains the point or tooth **19** on the star-shaped member to remain in its accurate solid-line position in FIG. 2. The risk of any receding movement of the rotary system **8—9** is thus cut out and the counting is always performed accurately.

In the second embodiment illustrated in FIG. 5, there is provided at least one elastic braking washer **24** between the return to zero cam **25** on one of the digit- carrying drums **26** and the hub **27** of the adjacent drum **28**. This washer which is mounted loose on the shaft **1** may be advantageously inserted between the toothed disc **5** of the unit drum **4** and the primary toothed wheel **8**.

What I claim is:

In an impulse counter comprising a plurality of successive coaxial digit-carrying drums provided with peripheral teeth, transfer pinions meshing with any two successive drums and a unit transfer pinion controlling the input drum, the combination of a toothed wheel coaxial with the drums meshing permanently with the unit transfer pinion, a star-shaped member coaxially rigid with said toothed wheel, means controlled by electric impulses to shift angularly in a predetermined direction the star-shaped member through successive half pitches, a single blade spring extending obliquely with reference to the plane of said toothed wheel and the tip of which is adapted to engage in succession the intervals between the teeth of said toothed wheel and means securing the end of said spring opposed to the tip thereof to a stationary point.

References Cited in the file of this patent

UNITED STATES PATENTS

465,269	Hopkins	Dec. 15, 1891
1,259,311	Steele	Mar. 12, 1918
1,261,449	Slye	Apr. 2, 1918
1,798,941	Helgeby	Mar. 31, 1931
2,049,499	Haselton	Aug. 4, 1936
2,360,927	Adell	Oct. 25, 1944
2,522,734	Wood	Sept. 19, 1950