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MOTOR-DRIVEN IMPULSE SENDER HAVING A PRESELECTOR FOR SETTING THE NUMBER OF IMPULSES TO BE TRANSMITTED

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Fig. 1

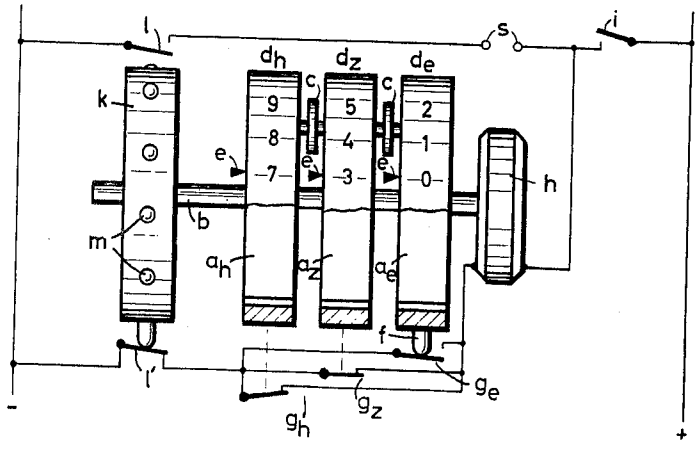


Fig. 2

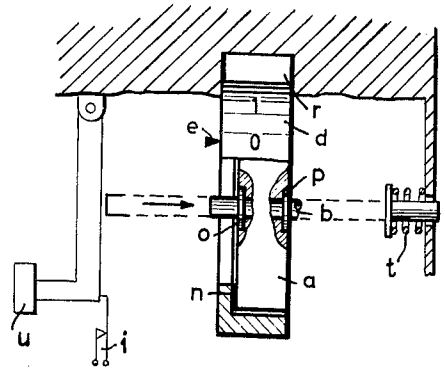
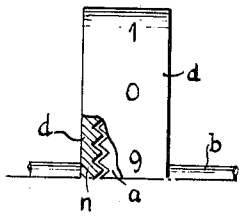


Fig. 3



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MOTOR-DRIVEN IMPULSE SENDER HAVING A PRESELECTOR FOR SETTING THE NUMBER OF IMPULSES TO BE TRANSMITTED

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The invention disclosed herein is concerned with a motor-driven impulse sender cooperating with a preselector for setting the number of impulses which are to be transmitted.

Program control devices for releasing a predetermined adjustable number of impulses are known for most varied purposes and in most varied embodiments. For example, a device of this kind may be made in the form of switching drums provided with different numbers of cams for determining the number of impulses which are to be released in a recurring rhythm. Punched tapes are also used to serve as program carriers, and counting cores are likewise known in which the number of impulses, given by an impulse sender, are stored, the impulse sender being disconnected when a desired number of impulses is reached, whereby the number of impulses which are to be transmitted is predetermined. All these devices are technically involved and either prone to develop trouble or requiring some expenditure for the setting of different impulse numbers.

The object of the invention is to provide a motor-driven impulse sender made of sturdy components and cooperating with a preselector for setting the number of impulses to be transmitted, which is technically of simple construction, easily manipulated and provides for reliable operation.

According to the invention, this object is realized by using, for the setting of the number of impulses which are to be transmitted, a mechanical counter to serve as the preselector cooperating with the impulse sender, said counter having a number of stages corresponding to the place or digit number of the impulse number and comprising number wheels which are by the action of the motor drive of the impulse sender positionally and with respect to the drive shaft individually set according to the appropriate place of the respective desired digits of the impulse number, to which they are manually preset, there being provided contacts which are operable by the number wheels and open only in the zero positions thereof, for controlling the stopping of the drive motor upon resetting the number wheels to the zero position theerof.

A synchronous motor, which assures impulses accurate as to time so far as the duration thereof and the spacing therebetween are concerned, is advantageously used to serve as a common drive for the impulse sender and for the mechanical counter.

According to a further feature of the invention, the impulses may be obtained or taken off, from the common drive, for example, the drive shaft, without any physical contacting thereof.

Further details, objects and features of the invention will appear from the appended claims and from the description thereof which is rendered below with reference to the accompanying drawing.

FIG. 1 shows in part sectional view an impulse sender with its motor drive and the plural-stage mechanical counter which can be preset;

FIG. 2 shows a counting wheel having a number or digit drum which is adjustable with the aid of a clutch having annular toothed mating surfaces; and

FIG. 3 shows details of the clutch illustrated in FIG. 2.

The mechanical counting mechanism shown in FIG. 1

comprises three counting wheels a_e, a_z, a_h, which are arranged upon a common drive shaft b. The counting wheel a_e is directly driven by the shaft b and the counting wheels a_z and a_h are driven by the shaft b over transfer gears c which operate with a gear reduction ratio of 10:1. The counting wheels a_h, a_z and a_e carry respectively number drums shown partially in section and designated by d_e, d_z, d_h, such number drums being provided upon the respective counting wheels so as to be with strong friction rotatable thereon, and being peripherally provided with the numbers or digits 0 to 9. Each of the number drums d_h, d_z, d_e, is angularly adjustable with reference to a setting or index mark e provided therefore. The counting mechanism is in the illustrated embodiment set so that 730 impulses can be given off or delivered by the impulse sender. For this purpose, the hundreds digit or number drum d_h is positioned to the digit 7, the tens number drum d_z is set to the digit 3 and the units number drum d_e is set to the digit 0. Each digit drum is provided with a cam f which opens in the zero position of the respective drum a break contact such as indicated respectively at g_e, g_z, g_h, thereby interrupting the drive h for the shaft b, namely, a stepping mechanism which is stepped along by impulses. Accordingly, in the illustrated condition, the contact g_e which is operable by the cam f of the units number drum d_e, is open, while the contact g_z for the tens place or digit and the contact g_h for the hundreds place are closed, since the respective cams f of these two latter drums are at such instant at different angular positions and therefore not visible in the figure.

Upon closure of the switch i, and assuming that the mechanical counter is in the just described manner set to a value other than zero, impulses from the impulse transmitter k will reach the stepping mechanism h over contact 1′ and over all three, but at least over one of the closed break contacts g_e, g_z, g_h, the stepping mechanism rotating by means of the shaft b, the units number drum d_e, and the cam drum k which is firmly connected with the shaft b, closing at the same time, with each revolution, ten times the impulse contacts 1, 1′, by means of its ten cams m, so that ten impulses are with each revolution of the shaft b delivered at the terminals s, corresponding to the ten digits or numbers of the number drum d_e. The cams m on the drum k are advantageously angularly displaced with respect to the impulse contact 1 and the digits 0 to 9 upon the units number drum d_e or the cooperating cams f and break contacts g_e, g_z, g_h, respectively, so that an impulse is delivered or given off always between two numbers or digits. The impulse contact 1 will then remain open at the conclusion of the impulse delivery, when all number or digit drums d_e, d_z, d_h are in zero position, thereby disconnecting the drive for the impulse sender k.

As noted before, the digit drums d_e, d_z, d_h are seated with strong frictional engagement, but rotatably, upon the respective counting wheels a_e, a_z, a_h, and therefore can be angularly adjusted with respect thereto. However, instead of placing the number drums d_e, d_z, d_h, which are provided with cams f, in strong frictional engagement with the respective counting wheels a_e, a_z, a_h, they may be connected with the counting wheels by annular toothed clutch gear means, as indicated in FIG. 2.

Referring now to FIG. 2, each number drum d is provided with a toothed clutch collar n meshing with an annular toothed clutch part of the respectively associated counting wheel a, the clutch tooth formation being of the so called Hirth type. Upon exerting on the shaft b, by means of a suitable lever u, a pressure in the direction of the arrow, for effecting the setting of the desired digit, the shaft will transmit the pressure to the counting wheel a, by the action of the follower disc o, thereby disengaging the counting wheel a from the toothed clutch collar n. The lever u by which the shaft b is shifted

in the direction of the arrow may be suitably coupled with the switch-in contact *i* which must in such case be constructed as a break contact. Upon release of the lever *u*, the shaft *b* will be moved in a direction opposite to the direction indicated by the arrow, by means of a suitable spring *t*, thereby taking along the counting wheel *a* by the action of the disc *p* and causing clutching reengagement thereof with the toothed clutch collar *n* of the number drum *d*. The number drum *d* is secured against lateral shifting by guide means *r* in order to enable the setting thereof upon shifting of the shaft *b* in the direction of the arrow and to secure the meshing of the toothed clutch parts upon motion of the shaft *b* opposite to the direction of the arrow.

Instead of being driven by the stepping mechanism *h*, the shaft *b* may be driven by a motor, if desired over an intermediate intermittently operating gear of known construction, so that the individual operations are again effected in steps of ten, thus increasing the accuracy; high accuracy may however not be required in many cases.

Any drive employed may be regulatable in known manner as to the speed thereof so as to vary the operation of the impulse sender and the impulse spacing; impulses which are accurate in time as to duration and spacing thereof can be produced when using a synchronous motor to serve as a drive *h*. The impulse spacing and the number of impulses with regard to the respectively set number of the mechanical counting mechanism can be varied upon using in place of the impulse sender having the cam drum *k* with its ten cams *m*, a drum with holes formed therein into which cam means may be plugged as desired.

Changes may be made within the scope and spirit of the appended claims which define what is believed to be new and desired to have protected by Letters Patent.

I claim:

1. An impulse generator for expressing preselected digit values, comprising a mechanical counting mechanism having a plurality of counting wheels operatively connected in predetermined ratios, a setting ring carried by and rotatable with each counting wheel, each ring being adjustable relative to its cooperable wheel about the axis of the latter, contact means for each wheel, each ring having contact actuating means for its cooperable contact means, operable when the counting wheels are in predetermined relative positions, a cam drum cooperable with contact means to actuate the same for producing an impulse, said cam drum being operably connected to said counting wheels for simultaneous rotation therewith, a stepping mechanism operatively connected to rotate said counting wheels and cam drum, and further contacts cooperable with and actuatable by said cam drum, said last mentioned contacts and the contacts associated with said setting ring being operatively disposed in the power supply circuit of said stepping mechanism whereby said second mentioned cam drum contacts are operable to generate impulses in said power circuit during predetermined actuation of said contacts associated with said setting rings for actuating said stepping mechanism.

2. Apparatus according to claim **1**, wherein said first mentioned impulse producing contacts associated with said cam drum are so arranged that an impulse is produced thereby intermediate impulses conducted to said stepping mechanism.

3. Apparatus according to claim **1**, wherein said stepping mechanism for effecting rotation of the cam drum and mechanical counter is constructed in the form of a synchronous motor.

4. In a rotary impulse sender arrangement, the combination of a rotatable drive shaft, means for rotating said shaft, an impulse sender rotatable with said shaft, having means cooperable with contact means to produce impulses in an impulse circuit, a plurality of counting wheels operatively connected to said shaft for continuous rotation therewith in predetermined ratios with respect to said shaft, means for preventing axial movement of each counting wheel with respect to said shaft, a setting ring carried by and rotatable with each counting wheel, means for preventing axial movement of each setting ring, an adjustable connection between each setting ring and its cooperable counting wheel comprising a toothed coupling releasable through axial displacement of said shaft and with it axial displacement of each counting wheel with respect to the associated setting ring, and means including an element carried by each of said setting rings for controlling the operation of said means for rotating said shaft, whereby said last mentioned means is rendered inoperable when the respective counting wheels, with their associated rings, have rotated in predetermined manner as determined by the adjustment of said setting rings relative to said counting wheels.

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