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RANDOM INFORMATION COUNTING APPARATUS

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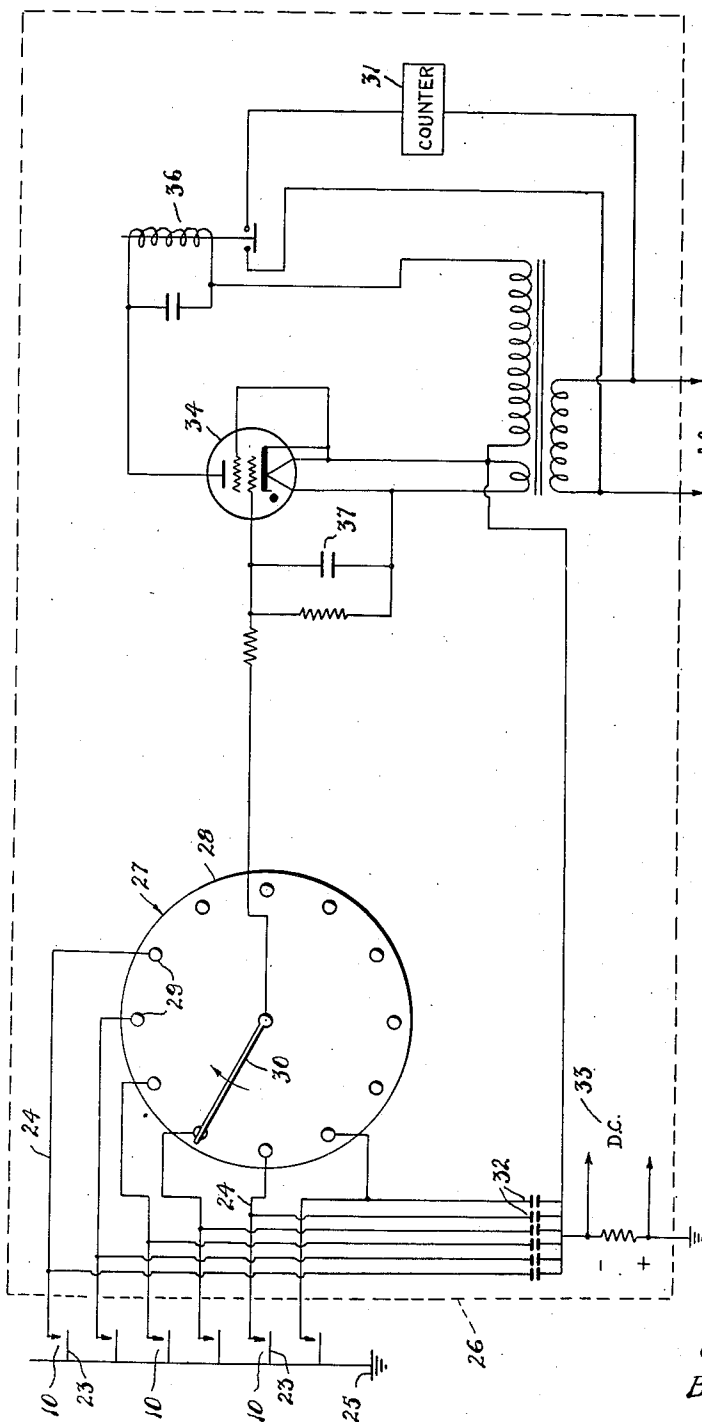


FIG. 1-

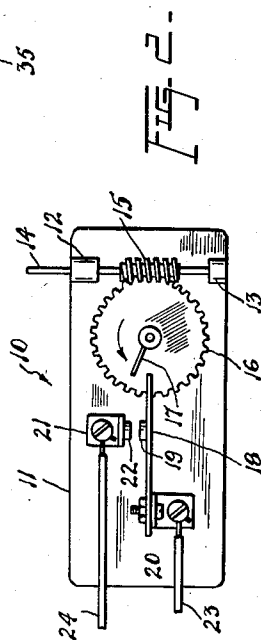


FIG. 2-

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RANDOM INFORMATION COUNTING
APPARATUS

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5 Claims. (Cl. 235—92)

This invention relates to new and useful improvements and structural refinements in counting apparatus of the type wherein electrical impulses received at random are coordinated into a sequential counting operation, and the principal object of the invention is to provide an apparatus of this nature which is particularly well adapted for counting the number of picks made by looms in textile works.

A loom in operation produces from 150 to 200 picks per minute and the loom operator is usually paid on the basis of the number of picks produced by the loom in a given pay period. For example, if a loom operates at the rate of 173 picks per minute, it will produce 83,040 picks if it is constantly in operation for a period of 8 hours. One operator may attend as many as 30 looms at the same time, the total production of which during an 8 hour period would be, theoretically, 2,491,200 picks. In actual practice, however, this figure will be substantially lower, depending upon the operator's efficiency in keeping the looms in operation, it being understood that a loom will automatically stop when an end breaks or some other trouble develops.

In accordance with conventional practice, a mechanism counter is attached to each loom to indicate the number of picks made by the loom in a given period, whereby to form the basis on which the loom operator is paid. If the looms are in operation during three shifts a day, three such counters are usually provided on each loom. The task involved in reading the information from the counters each day is of considerable magnitude when considering that a textile mill may have anywhere from 150 to 2,000 looms in operation.

The present invention eliminates this disadvantage by the provision of an apparatus whereby electrical impulses, proportional to the picking rate of a loom are transmitted from a number of looms to a central point where they are coordinated to count by a single counter the total picks made in a given period by all the looms attended by a single worker. In that manner several individual counters may be used for several individual workers, respectively, and the information to be derived from such counters is available at a central point, without the conventional necessity of having to read the counters on the individual looms and computing such information in order to arrive at the total production of each operator of several looms.

In accordance with the instant invention the electrical impulses from the various looms are received at random, that is, two or more impulses may occur at the same instant. It is, therefore, an important feature of the invention to receive such impulses at random and arrange them sequentially, that is, one impulse at a time, for counting purposes.

Other advantages and features of the invention will become apparent from the following description taken in conjunction with the accompanying drawing, wherein like characters of reference are used to designate like parts, and wherein:

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Figure 1 is a diagrammatic illustration of the counting apparatus in accordance with the invention; and

Figure 2 is a top plan view of one of loom switches.

In accordance with the invention, each of several looms 5 attended by a particular worker is provided with an impulse switch, such as is shown in Figure 2 and designated generally by the reference numeral 10.

The switch 10 comprises a suitable base plate 11 provided with bearings 12, 13 for a shaft 14, the latter being 10 connected in any suitable manner to the cam shaft of a loom so that its rotation is directly proportional to the number of picks made. The shaft 14 is equipped with a worm 15 which meshes with a gear 16 rotatably mounted on the plate 11. The gear 16 carries a finger 17 which 15 rotates with the gear and, once during every revolution, engages a resilient switch arm 18 having a contact point 19 thereon. The arm 18 is fastened at one end thereof to an insulated bracket 20 on the plate 11, while 20 a similar bracket 21 on the plate 11 is equipped with a contact point 22 to electrically engage the point 19 when the resilient arm 18 is first drawn away from the bracket 21 by the finger 17 and then springs toward the bracket 21 to establish a momentary contact of the points 19, 22. As soon as this momentary contact is made, it is broken 25 by the return of the arm 18 to its initial position wherein it remains until it is again engaged by the finger 17 during the next rotation of the gear 16.

The brackets 20, 21 are provided with suitable terminal screws having a pair of electrical conductors 23, 24 30 connected thereto, it being noted that the conductors 23 of the several switches of the respective looms are connected to a common ground 25.

The conductors 24 of the several switches of the respective looms attended by one particular worker are 35 taken to a remote, central point such as a control panel 26, at which there is provided a rotary sampling switch 27. The latter comprises a plate 28 having a plurality of circumferentially spaced contacts or segments 29 thereon, the number of these contacts or segments corresponding to 40 the number of looms attended by the worker. The plate 28 also carries a rotor arm 30 which is suitably driven at a fixed rate so as to successively engage the contacts 29, each once during a certain period of time.

The wires or conductors 24 from the several switches 45 10 are connected to the respective contacts 29 of the sampling switch 27, it being noted that for simplicity of illustration in the accompanying Figure 1, only a few of such connections have been shown.

The sampling switch 27 is adapted so as to retain an 50 electrical impulse on any one of the contacts 29 until such impulse is picked up by the rotor arm 30 and transmitted by means hereinafter described to a suitable counter 31. Moreover, after the impulse is picked up by the rotor arm, the segment or contact 29 must be free of 55 the impulse. Finally, the rotor arm 30 must make contact with all the segments 29 in less time than can possibly exist between two successive impulses applied to any particular segment.

In order to satisfy the above conditions, a plurality of 60 capacitors 32 are provided between the respective conductors 24 leading to the respective segments 29 and a common direct current supply 33. The polarity of the current supply 33 is such that the capacitors are charged when the respective switches 10 are momentarily closed, 65 thereby making the segments 29 positive with respect to the cathode of a suitable gas control tube 34.

The freeing of impulses from the respective segments 29 is effected by making the time constant of the circuit 70 connected to the rotor arm 30 extremely short whereby to essentially discharge the capacitor when contact of the rotor arm with the segment is made, the current of discharge being employed to actuate the counter circuit.

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Finally, the contact of the rotor arm 30 with all the segments 29 in less time than exists between two successive impulses to any given segment is effected by rotating the rotor arm at a speed greater than the rate of occurrence of the impulses.

When the rotor arm 30 picks up an impulse from any one of the segments 29, the grid of the tube 34 is rendered positive, causing the tube to conduct. The counter 31 is in circuit with a source of alternating current 35 and with the tube 34 through a relay 36, the closing of the latter being arranged to actuate the counter each time positive potential is delivered to the grid of the tube.

As will be also noted, the circuit includes a capacitor 37 which absorbs the charge left on each of the segments 29 and reduces the positive potential thereof to a value which is too low to cause the tube 34 to conduct for a second time.

The operation of the invention will be apparent from the following example:

Let it be assumed that one particular operator attends 60 looms and that it is desired to count the total production in terms of number of picks of these looms. Each loom is provided with one of the switches 10 and the sampling switch 27 is equipped with 60 of the segments 29, connected to the wires 24 of the respective switches 10. Moreover, 60 of the capacitors 32 are connected to the respective wires 24.

Let it be assumed further that each loom is operating at the rate of 173 picks per minute which, through the medium of the reduction gearing 15, 16 in the switch 10, is represented by 1.73 impulses per minute which will be fed by each loom to the sampling switch 27 while the loom is actually running.

Under such circumstances the rotor arm 30 is arranged to rotate at a fixed speed of, let us say, 2 revolutions per minute, which is sufficiently fast to prevent more than one impulse being applied to any one of the segments 29 at one time.

The apparatus will thus receive the impulses occurring at random and arrange them sequentially through the medium of the switch 27, so that each time the tube 34 is rendered conductive the counter 31 will be actuated and, during a specified pay period, the counter will indicate, in terms of thousands or hundreds of units, the number of picks made by all the looms attended by the same operator.

The arrangement of the control panel 26 is duplicated, of course, for each operator whose work is to be counted, all such panels being located at a common control point, remote from the looms themselves, where the several counters may be conveniently read.

It is to be understood that although in the foregoing the invention has been described in association with the function of counting picks made by looms, it may be effectively employed for various other counting operations, wherever count actuating impulses, occurring at random, are to be coordinated into a sequential counting arrangement.

While in the foregoing there has been described and shown the preferred embodiment of the invention, various modifications may become apparent to those skilled in the art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure and various modifications may be resorted to, such as may lie within the spirit and scope of the appended claims.

What is claimed as new is:

1. In a counting apparatus, the combination of a plurality of independently actuated primary switches, a rotary sample switch including a plurality of contacts in

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circuit with the respective primary switches and a rotor engageable individually and successively with said contacts, means for delivering and storing an electrical impulse in said contacts when the respective primary switches are actuated comprising independent capacitors in circuit with the respective contacts and a source of current, an impulse receiving tube connected to said rotor and adapted to pick up impulses from the latter, a counter, and a relay in circuit with said counter and said tube, whereby impulses delivered at random to said contacts are coordinated to sequentially actuate said counter through said tube.

2. The apparatus as defined in claim 1 together with an impedance network in circuit with said rotor for discharging potential therefrom to a value insufficient for actuating said tube more than once in a given impulse.

3. The apparatus as defined in claim 1 together with a resistor capacitor network in circuit with said rotor for discharging potential therefrom to a value insufficient for actuating said tube more than once in a given impulse.

4. In counting apparatus, the combination of a plurality of periodic impulse switches independently and momentarily actuated in random order; a rotary sample switch including a plurality of contacts in circuit with the respective impulse switches and a rotor engageable individually and successively with said contacts, a plurality of impulse storage capacitors each connected on one side to a respective one of said plurality of contacts and to its respective impulse switch, and on the other side to a source of current; a capacitor charge circuit for each of said impulse storage capacitors including the respective impulse switch and said current source whereby when the impulse switch is actuated said capacitor stores an electrical impulse; a capacitor discharge circuit for each of said capacitors including said respective contact of the rotary sample switch, said rotor, and a resistance-capacitance network, whereby said impulse is delivered to the respective contact of said rotary sample switch when said contact is engaged by the rotor, a gas control tube connected to said rotor and adapted to pick up impulses from the latter, a counter, and a relay in circuit with said counter and said tube whereby impulses delivered at random to said contacts are coordinated to sequentially actuate said counter through said tube.

5. In a momentary contact electric switch, the combination of a frame, a stationary contact fixed to said frame and with a contact face lying in a first plane, a resilient arm fixed at one end to said frame and having a free end extending parallel to said first plane, a coacting contact provided on said arm opposite the fixed end facing the stationary contact and spaced from the latter when the resilient arm is in an initial position, and a rotatable finger intermittently engageable with the free end portion of said arm, means for rotating said rotatable finger in a direction whereby the resilient arm may be moved from said initial position in a direction away from the stationary contact, and upon disengagement from said finger, said arm because of its resiliency may oscillate first toward the stationary contact to momentarily bring the contacts together and then away from the stationary contact to return to its initial position.

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