

July 20, 1937.

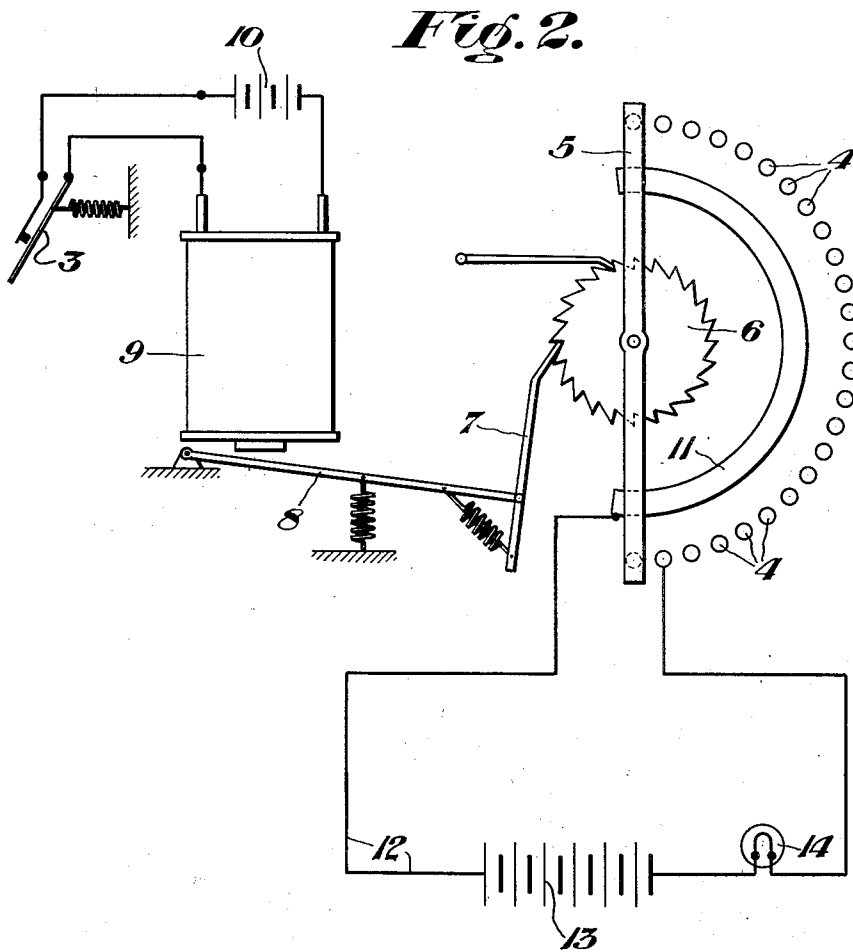
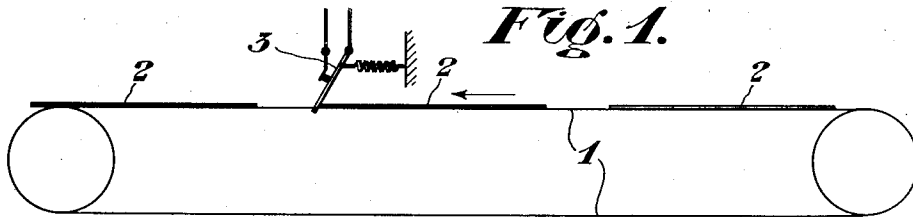
J. T. NICHOLS

2,087,860

AUTOMATIC COUNTER

Filed Feb. 18, 1933

2 Sheets-Sheet 1



*Inventor:*  
JOHN T. NICHOLS,  
by *Usina & Rauber*  
his Attorneys.

July 20, 1937.

J. T. NICHOLS

2,087,860

AUTOMATIC COUNTER

Filed Feb. 18, 1933

2 Sheets-Sheet 2

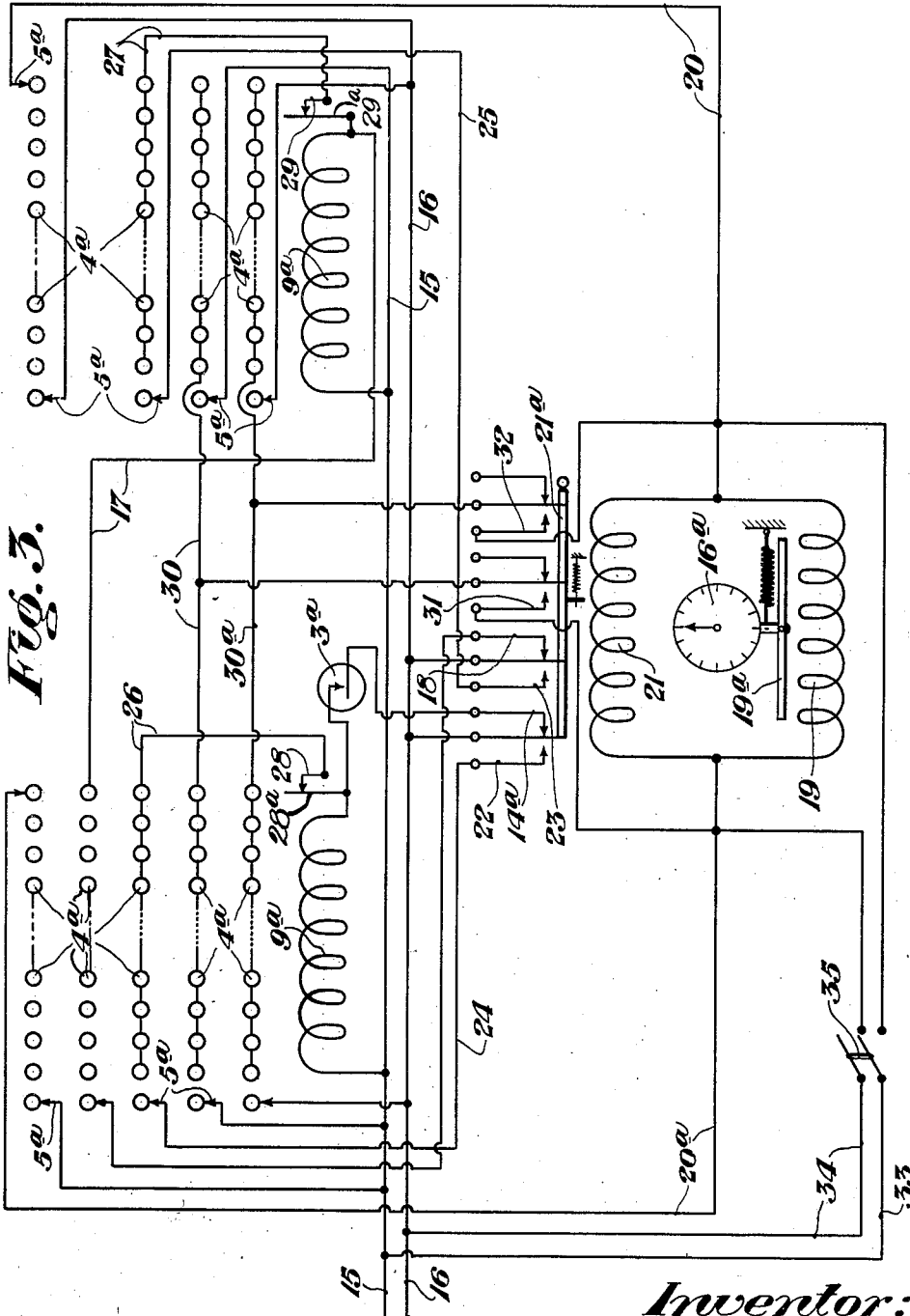


Fig. 3.

Inventor:  
JOHN T. NICHOLS,  
by *Maria Rauber*  
his Attorneys.

# UNITED STATES PATENT OFFICE

2,087,860

## AUTOMATIC COUNTER

John T. Nichols, Pittsburgh, Pa., assignor to  
American Sheet and Tin Plate Company, a cor-  
poration of New Jersey

Application February 18, 1933, Serial No. 657,439

### 1 Claim. (Cl. 235-92)

This invention relates to automatic counters, one of the objects being to automatically count continuously moved units until a predetermined number of units has been counted, and to then effect the closing of an electric circuit.

The drawings diagrammatically show a specific example of the invention as follows:

Figure 1 is a side view of units being counted.

Figure 2 shows an elementary form.

Figure 3 shows a form more fitted for commercial use.

An endless conveyer 1 successively carries the units 2, which are to be counted, into contact with a switching device 3. This device is illustrated as comprising a movable contact which is swung against a fixed contact by the units. However, other forms of circuit makers and breakers may be used.

It might be here mentioned that the units are shown as sheets of tin plate. These are chosen for illustrative purposes because, although usually packed at the mill in packages of 112 sheets, it is frequently necessary to make packages of other numbers of sheets.

The switching device 3, when arranged in a suitable circuit, may operate a switch of the character illustrated by Figure 2. This switch includes a plurality of contacts 4 positioned in an arc and provided with a swinging contactor 5. This contactor is driven through a ratchet 6 by a pawl 7 which is connected to an armature 8 pivoted adjacent an electromagnet 9.

The electromagnet 9 is in circuit with the switching device 3 and a battery 10. Each time the switch 3 is closed the contactor 5 is advanced to the next of the contacts 4. The contactor serves to close a circuit through a segment 11, line 12, battery 13, lamp 14 and an optional one of the contacts 4.

When the lamp 14 lights it is a visual indication that the number of units has passed the switching device 3 which corresponds to the number of contacts to which the contactor 5 moves to reach the one chosen. By varying the lead from the lamp 14 to other of the contacts 4 it is possible to vary the number of units passed before illumination of the lamp 14 occurs.

This lamp is merely illustrative and may be substituted by an electromagnetically actuated counter of any suitable commercial type. Also, the circuit through the lamp 14 may be used for other purposes.

The invention in the form shown above may be advantageously used when desired groups contain relatively few of the units. However, the

fundamental idea there disclosed may be easily elaborated so that the units may be counted into groups practically without a limitation as to quantity.

Such an elaboration is illustrated by Figure 3. Here the fixed contacts 4<sup>a</sup> are arranged in two groups, each containing a number of banks of the contacts. In each instance these contacts are positioned in arcs and provided with a contactor 5<sup>a</sup>.

Each group of contacts and their contactors may be considered as a separate switch which is constructed in substantially the same manner as the one illustrated by Figure 2. Figure 3 shows a single electromagnet 9<sup>a</sup> for each of the contactors 5<sup>a</sup> in each group, it being understood that this is a diagrammatic representation and that it is actually necessary to have an electromagnet associated with each and every contactor so as to move them. That is, in either of the groups a single electromagnet may be mechanically interconnected with all the contactors in that group so that movement of one contactor moves them all, or a separate electromagnet may be associated with each contactor and all the electromagnets in each group electrically interconnected for simultaneous operation. If desired, the arrangement being described may be effected by the use of automatic telephone switches which may be purchased any place and which may be interconnected in accordance with this disclosure by any reasonably competent electrician.

The apparatus is energized throughout by power lines 15 and 16. When the switch 3<sup>a</sup>, which may be similar to the one already described, is closed by passage of the units being counted, a circuit is established to the electromagnet 9<sup>a</sup> of the first switch.

This may be traced from the line 15 through the electromagnet 9<sup>a</sup>, closed switching device 3<sup>a</sup>, closed contact 14<sup>a</sup>, and so to the line 16. Thus, the interconnected contactors 5<sup>a</sup> of the first switch are advanced over the banks of contacts 4<sup>a</sup>. This advance is, of course, from one contact to the other for each unit passed.

The last of the contacts 4<sup>a</sup> in the second bank of the first switch is connected through a line 17 to the electromagnet 9<sup>a</sup> of the second switch. Thus, when the capacity of the first switch is exhausted the electromagnet 9<sup>a</sup> of the second switch is energized so that its contactors are advanced to the next line of contacts. This circuit may be traced from the line 16 through the closed contact 18, the contactor for the second bank of the first switch, the last contact of this bank, line 17, 55

through the electromagnet 9<sup>a</sup> of the second switch, and so to line 15.

It now becomes apparent that the capacity of the switch originally described has been increased tremendously.

Instead of the lamp previously described, a counter 16<sup>a</sup> operated by an electromagnet 19 and an armature 19<sup>a</sup> is illustrated. The circuit to this electromagnet is established when the contactors of both switches reach optional ones of the contacts of both. The choice of these contacts is made according to the number of units desired in each group.

The contacts in the second switch are, of course, multiples of the total number in the first, and it follows that proper selection of the contacts in each switch effect the desired count. In the present instance the illustration shows the maximum count possible. That is to say, the extreme right hand contact of the top bank of each group is arranged to establish the circuit to the electromagnet 19.

This circuit for the above may be traced from the line 16 through the topmost contactor 5<sup>a</sup> and the selected one of the contacts 4<sup>a</sup> of the second switch, line 20, through the electromagnet 19, line 20<sup>a</sup>, to the selected contact of the uppermost bank of the first switch and through the uppermost contactor 5<sup>a</sup> of this switch to the line 15.

In Figure 3 the contactor of the first switch is just beginning its first cycle of operation. When the two contactors reach the selected ones of the contacts the electromagnet 19 will be energized so that the counter 16<sup>a</sup> registers the fact that one group of units has passed the switching device 3<sup>a</sup>. As previously mentioned, the circuit through the operating electromagnet 19 may be utilized for other purposes.

It is desirable that an apparatus of the character disclosed be automatically reset so as to be ready for further operation. For this purpose an electromagnet 21 is arranged between the lines 20 and 20<sup>a</sup> for simultaneous energization with the electromagnet 19. This operates an armature 21<sup>a</sup> which opens the already mentioned contacts 14<sup>a</sup> and 18 so that the switching device 3<sup>a</sup> and the contactor 5<sup>a</sup> of the second bank of contacts in the first group are disconnected.

When this occurs the movable members of these contacts just broken, which are directly connected to the line 16, are swung against two contacts 22 and 23 which are connected through lines 24 and 25 to the contactors for the third bank of contacts in the first group and the second bank in the second group. These banks of contacts in each switch are circuited together in each instance by lines 26 and 27, excepting the first contacts in each instance, so as to effect energization of the operating electromagnets 9<sup>a</sup> of the two switches.

In each instance this energization is effected through current interrupters 28 and 29 so that suitable operating current impulses are effected. These interrupters may include small operating armatures, 28<sup>a</sup> and 29<sup>a</sup> which are attracted by the contactor-driving electromagnets 9<sup>a</sup>.

Preferably, the contactors 5<sup>a</sup> each comprise two diametrically extending contacting portions as is disclosed by the switch illustrated by Figure 2. With this construction it is only necessary to advance the contactors relatively short distances to bring them to the contacts from which they started as they are in effect double acting. If the contactors extended in but one direction from their pivotal points, it would be necessary

to turn them considerable distances by some other means. Since the contactors 5<sup>a</sup> have these two extending contact portions, one of the same will be contacting the first of the contacts 4<sup>a</sup> while the other is on the last of these contacts. Thus, in effect, the contactors 5<sup>a</sup> are reset to their starting positions the moment they reach the last of the contacts 4<sup>a</sup>, this being diagrammatically illustrated by Figure 3.

During the time the contactors are being moved to their starting contacts it is necessary to maintain the electromagnet 21 energized. To accomplish this, the contacts of the last two banks of both switches are interconnected by the lines 30 and 30<sup>a</sup>, excepting the first of the contacts, in each instance, and their associated contacts are connected to the lines 15 and 16.

Operation of the armature 21<sup>a</sup> closes two contacts 31 and 32 which are respectively connected to the lines 30 and 30<sup>a</sup>. The contact 31 is connected to the line 20<sup>a</sup> and the contact 32 to the line 20, whereby energization of the electromagnet 21 is effected until the contactors return to their starting contacts.

This incidentally causes continued energization of the circuit through the electromagnet 19. As this is the circuit used for other purposes, it follows that this relatively long period of energization increases the possibilities of the invention.

The circuit for the above may be traced from the lines 15 and 16, through the contactors and contacts of each of the last two banks, and from the lines 30 and 30<sup>a</sup> interconnecting these contacts, through the closed contacts 31 and 32 to either side of the electromagnets 21 and 19.

In case it proves desirable to effect resetting of the apparatus without regard to the number of units counted, lines 33 and 34 may be arranged from the lines 15 and 16 to either side of the electromagnet 21. A switch 35 interposed in the lines 33 and 34 may be used as a control. The operation resulting from closing this switch is the same as that of the normal resetting of the apparatus, excepting that the count attained is immaterial.

Although specific forms of this invention are disclosed in accordance with the patent statutes, it is to be understood that the inventive scope is not to be limited exactly thereto, except as defined in the following claim.

I claim:

A counter including the combination of a plurality of contacts arranged in two or more groups, a contactor for each of said groups, means for advancing the contactor for one of said groups from one of its contacts to another, means operable by the units to be counted for controlling said means for advancing said contactor for said group, means for advancing the contactor for another of said groups from one of its contacts to another each time said contactor for said first named group reaches the last of its contacts, said contactor for said first named group being adapted to arrive at the contact from which it started each time it reaches the last of the contacts of said first named group, an electrical circuit arranged through said contactors and an optional one of said contacts in each of said groups, and means for bringing said contactors for said first and second named groups to the contacts from which they started when said electrical circuit is closed.

JOHN T. NICHOLS.