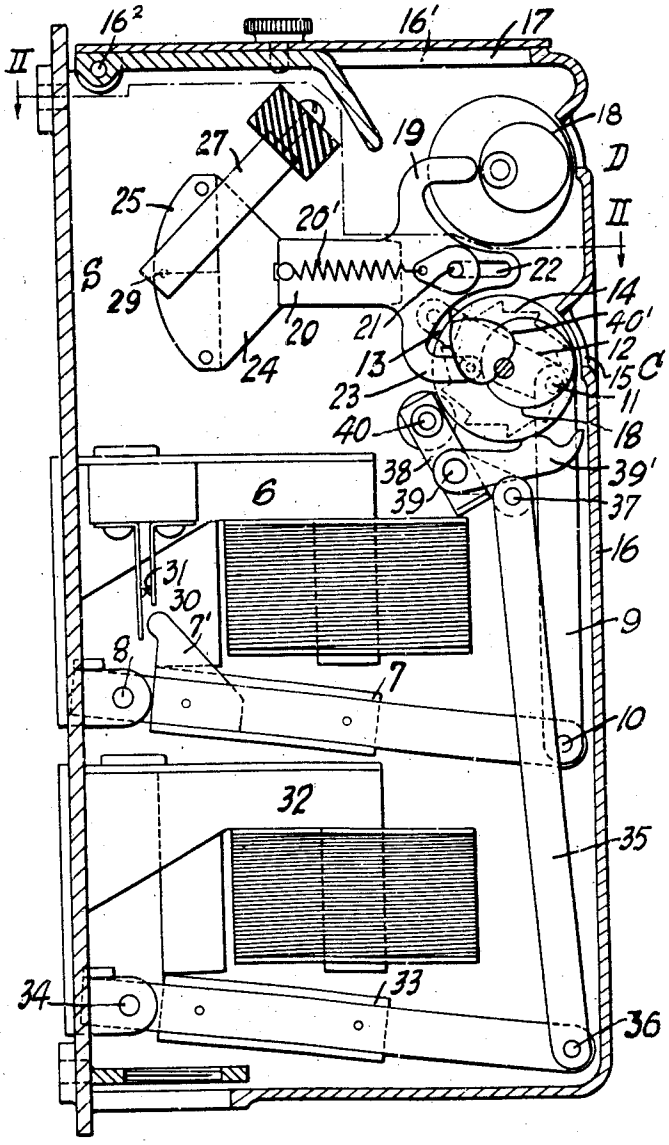
Aug. 16, 1949. O. EDLER 2,479,482

COUNTING MECHANISM

Filed Feb. 27, 1945 5 Sheets-Sheet 1

Fig. 1.



Inventor:
Otto Edler,
By his attorneys,
Baldwin & Wright

Aug. 16, 1949. O. EDLER 2,479,482

COUNTING MECHANISM

Filed Feb. 27, 1945 5 Sheets-Sheet 2

Fig. 2.

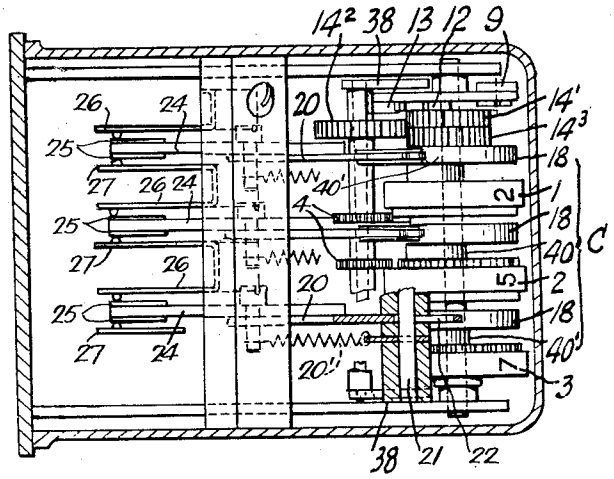
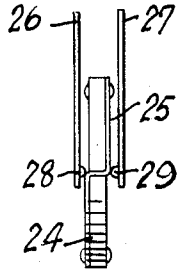


Fig. 4.



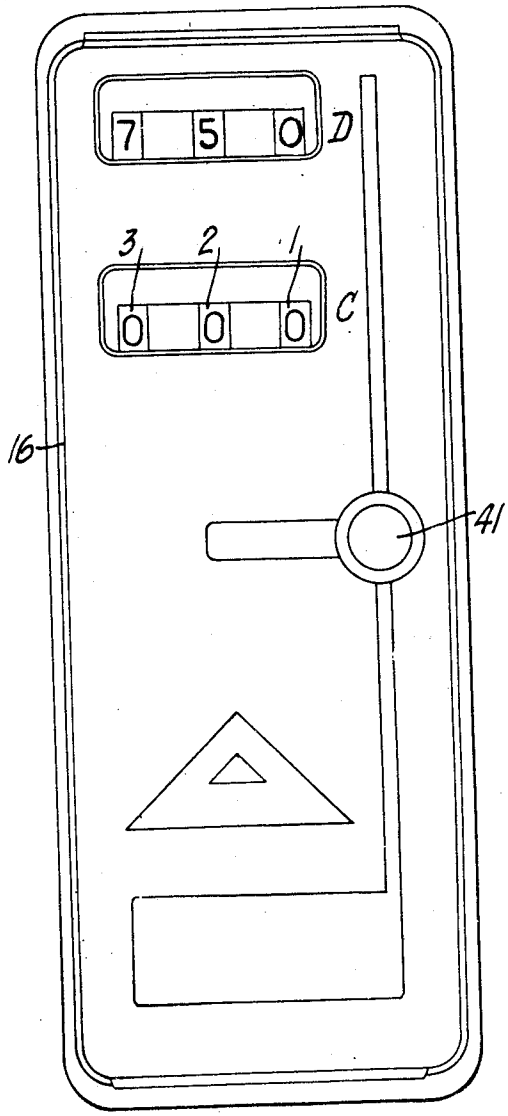
Inventor:
Otto Edler,
By his attorneys,
Baldwin & Wright

Aug. 16, 1949. O. EDLER 2,479,482

COUNTING MECHANISM

Filed Feb. 27, 1945 5 Sheets-Sheet 3

Fig. 3.



Inventor:
Otto Edler,
By his attorneys,
Baldwin & Wight

Aug. 16, 1949. O. EDLER 2,479,482

COUNTING MECHANISM

Filed Feb. 27, 1945 5 Sheets-Sheet 4

Fig. 5.

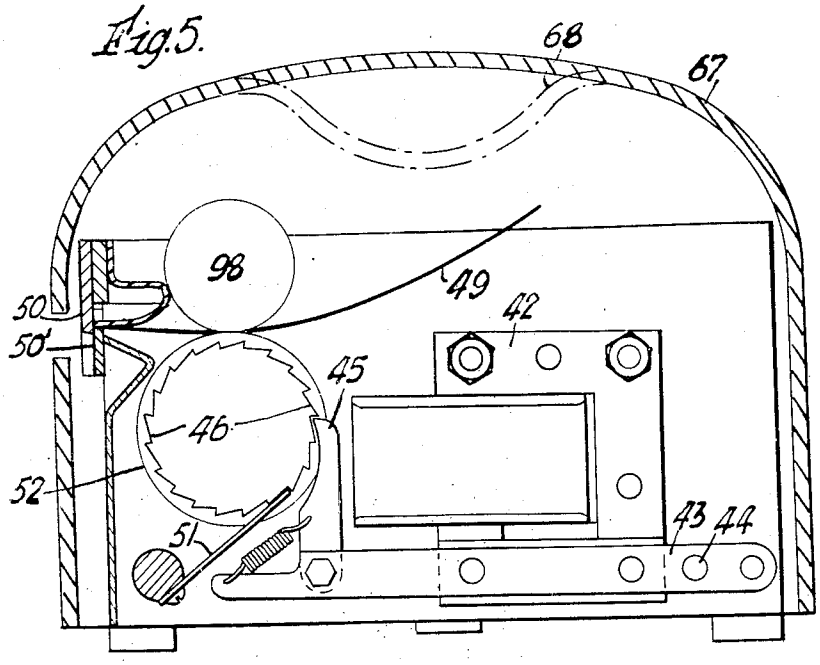
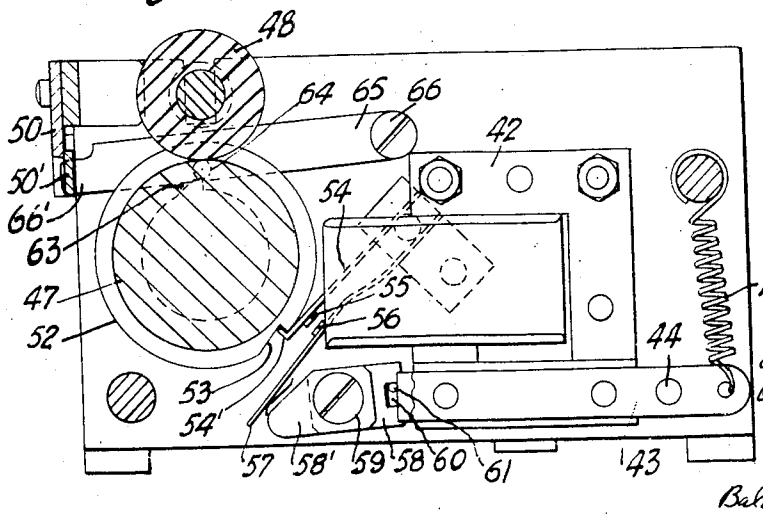


Fig. 6.



Inventor:
Otto Edler,
By his
Attorneys,
Baldwin & Wight

Aug. 16, 1949. O. EDLER 2,479,482

COUNTING MECHANISM

Filed Feb. 27, 1945 5 Sheets-Sheet 5

Fig. 7.

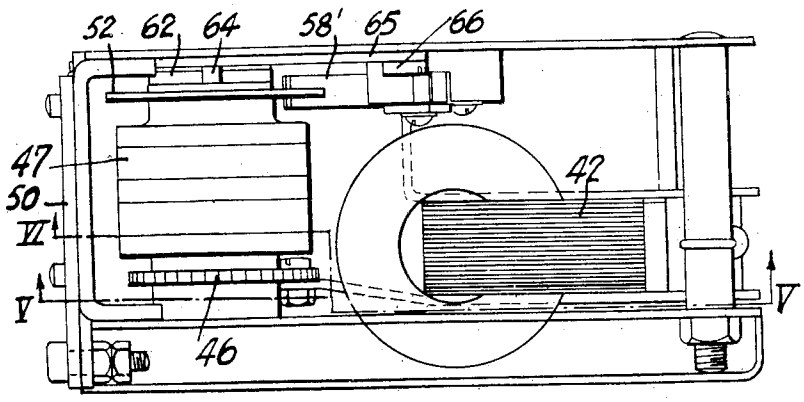


Fig. 8.

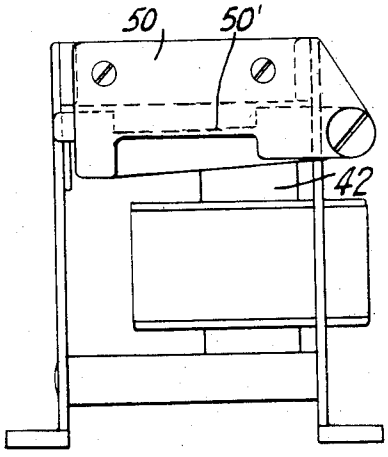
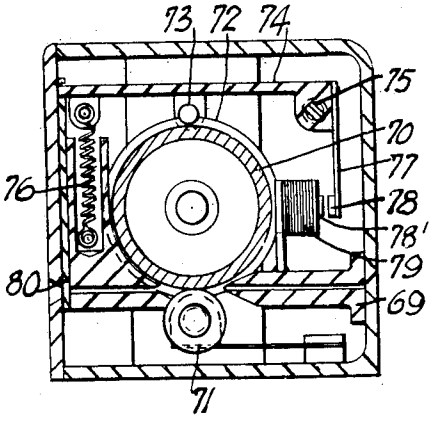


Fig. 9.



Inventor:
Otto Edler,
By his attorneys,
Baldwin & Wight

Patented Aug. 16, 1949 2,479,482

UNITED STATES PATENT OFFICE

2,479,482

COUNTING MECHANISM

Otto Edler, London, England, assignor to Soag Machinery Company, Soag Machine Tools Ltd. (Proprietors), Lambeth, London, England

Application February 27, 1945, Serial No. 580,000
In Great Britain March 15, 1944

3 Claims. (Cl. 235—132)

1

This invention relates to improvements in counting mechanism intended to afford an indication of a counted batch in a succession of articles. The invention is especially concerned with the counting of the products of a printing or processing machine as they are delivered from the machine to a pile or stack delivery.

The main object of this invention is to provide a counting mechanism which will be reliable in use, adaptable for ready fitting to various types of machine and capable of easy adjustment for different numbers of articles to be contained in the indicated count.

In carrying the invention into effect the mechanism utilises an adjustable step-by-step counting mechanism to be operated by the articles as they pass in succession (or by some part operated synchronously with such passages) and an electrical contact arrangement for controlling the circuit of an electrically operable means of affording the desired count indication in the succession of articles, the contact arrangement being itself under the control of the counting mechanism. While the counting mechanism can itself be operated by a mechanical transmission, it is preferred here again to be non-mechanical (e. g. by electrical or fluid-pressure transmission) having the advantage of flexibility in fitting.

The adjustment of the count can be effected by varying the relative starting position of the contact devices and of the mechanism by which the contact devices are operated through the counting mechanism. The adjustment may however be provided for by employing a pre-setting mechanism similar to the counting mechanism, the two mechanisms conjointly controlling the contact devices and being so arranged that only when the parts of the counting mechanism are at the same position as the parts of the pre-setting mechanism are the contact devices rendered operative. Such an arrangement is illustrated in the accompanying drawings in which Figures 1, 2, 3 and 4 are views of a counting unit, Figure 1 being a vertical sectional elevation, Figure 2 a transverse section on the line II—II, Figure 1, Figure 3 a front elevation and Figure 4 a detail view of contact mechanism which is employed.

Figures 5, 6 and 7 are views of a slip insertion unit which is controlled by the counting unit of Figures 1–4, Figure 5 being a section on the line V—V, Figure 7, Figure 6 being a section on the line VI—V, Figure 7, with the cover removed,

2

and Figure 7 a plan view. Figure 8 is an end elevation of the severing mechanism.

Figure 9 is a sectional view of a modified slip inserting arrangement.

Referring firstly to Figures 1–4, the counting mechanism is of the well known type employing intergeared counting wheels so related that when one completes one revolution it advances the next $\frac{1}{10}$ revolution and so on. In the drawings a three wheel counter is shown and the counter wheels are indicated at 1, 2 and 3 and as is usual these wheels have numerals formed peripherally upon them for the purpose of indication, the intergearing of the wheels being effected by gears indicated at 4. Further description of this mechanism is believed to be unnecesary as it is well known counting wheel type.

The counter (which is hereinafter referred to generically as C) is controlled in its operation by an electromagnet 6 the armature 7 of which is pivoted at 8. The winding of this electromagnet is energised in step with the delivery of the articles to be counted so that as each article passes the circuit of the electromagnet is energised and the armature 7 is caused to swing upwardly and then upon de-energization of the electromagnet is released. This movement of the armature 7 is utilised to operate the first wheel of the counter C through a link 9 which is pivoted at 10 to the armature 7 and is connected at its other end at 11 to a rocking lever 12 having a driving pawl 13 engaging teeth 14 on a disc fast with a gear 14′ in mesh with a gear 14^2 also meshing with a gear 14^3 fast with the first wheel 1 of the counter C. Thus as successive electrical impulses are received by the electromagnet 6 the first wheel 1 of the counter C is operated step by step, this wheel when the first ten articles have passed effecting rotation through the gears 4 of the wheel 2 through $\frac{1}{10}$ of a revolution and so on. Thus the counter C affords an indication by the numerals on the peripheries of its wheels 1, 2 and 3 of the number of articles which have passed, these numerals being visible through a window 15 formed in a casing 16 in which the mechanism of this counting unit is contained.

In order now to arrange the mechanism so that when a predetermined number of articles has passed there shall be effected some operation which will afford an indication of that number of articles, there is provided a second counter D comprising wheels corresponding to the wheels 1, 2 and 3 of the counter C, these discs however not being intergeared but being capable of individual adjustment through an opening 17 in the

casing 16 to pre-set this second or pre-setting counter to a position corresponding to the number of articles required to be indicated or the top cover 16' of the casing can be hinged as at 16^2 to provide access to the discs of the counter D.

It is desired that when the number of articles corresponding to that indicated by the setting counter has passed to a given point there shall be some operation which will afford an indication of that number in the succession of articles; for this purpose the two counters C and D are employed to effect a conjoint control of the indicating mechanism that is to say one counter, i. e. the counter D is pre-set to the required number and the other counter i. e. the counter C, moves towards a corresponding position as the articles successively pass and when both counters are in the same position then the indicating mechanism is caused to operate. For this purpose each of the wheels of both of the counters has on it a cam 18 the cams all being similar; the various cams of the counter D each control respectively one arm 19 on a plate 20 having a slot 22 which is pivotable and slidable on a fixed pin 21, the plate 20 being urged towards the cams 18 by a spring 20'. The cams 18 of the counter C each control a second arm 23 of the plate it being understood that there are three plates in the particular arrangement shown one for each of the three counter wheels indicated in the drawing. These various plates 20 each has secured to it a component 24 of electrically insulating material and this material has on it a metallic strip 25 which as shown in Figure 4 extends part-way along one face of the component 24 then through a slot in that component and then down the other face. This component 24 extends between contacts 28 and 29 on the two blades 26 and 27 of a blade switch S, the three blade switches being in series in a controlling circuit for the indicating mechanism to be regulated by the counting mechanism.

As will be seen from Figure 4, formation of the strip 25 is such that only when the arms 24 are horizontal are the contacts 28 and 29 of the switches closed through the strip 25. In any other position of the component 24 one or other of the contacts 28, 29 is in engagement not with the metal strip 25 but with the insulating material of which the component 24 is formed.

The arrangement of the parts is such that so long as any one cam 18 of the counting unit C is in a different position from that of the corresponding cam 18 of the setting counter D, then at least one of the components 24 will be away from the horizontal position. In other words, so long as the cams 18 of the counter C are in different angular positions from those of the cams 18 of the counter D, the electrical circuit through the blade switches will be open for at least one of the series connected switches. When now in the passage of the articles, the counter C reaches an indication corresponding exactly to the indication of the setting counter D all of the cams of both of the counters C and D will be in exactly similar position and then the three components 24 will also all be in the horizontal position and at this time there will be a closed circuit through the three blade switches. The closure of this circuit is utilised to effect an indicating operation which will be hereinafter described.

In order that the closing of the circuit including the three switches shall be timed to the operation of the electromagnet 6 so that the

controlling effect of the closed circuit shall be applied only when the electromagnet 6 is de-energised, there is provided a further blade switch 30 the contacts 31 of which are closed only when the armature 7 is not attracted to the core of the electromagnet the armature 7 being for this purpose provided with a controlling finger 7'.

For the purpose of re-setting the counter C at the time when the previous count has been indicated in the manner hereinafter referred to, there is employed a second electromagnet 32 which is energised by the completion of the indicating circuit in the manner referred to; the armature 33 of this electromagnet is pivoted at 34 and is connected by a link 35 pivoted to the armature at 36 and pivoted also at 37 to a frame 38 itself pivoted at 39. This frame carries the spindle 40 on which the interconnecting gears 4 and 5 and the gear 14^2 are mounted; when at the conclusion of the counting operation the electromagnet 32 is energised, the link 35 causes the frame 38 to rock to take the gears 4 and 5 on the spindle 40 out of mesh with the wheels 1, 2 and 3 of the counter C so as to free them from restraint. In addition the frame 38 has extensions 39' one for each counting wheel and these extensions are shaped to engage with heart shape cams 40' each fast respectively with the wheels 1, 2 and 3 of the counter C. The arrangement is such that the gears 4, 5 and 14^2 having been moved out of mesh with the counters 1, 2 and 3, the same movement which effects this operation also brings the extensions 39' into engagement with the respective cams 40' which, being heart shaped, are caused by this engagement to return the counters 1, 2 and 3 to their zero position in readiness for the next operation.

If desired there may be employed a push button 41 by means of which the counter C can at any time be re-set manually this button 41 operating a switch to close the circuit of the electromagnet 32.

It will now be seen that the mechanism so far described provides a means for completing an electrical circuit (i. e. the circuit including the switches S and 30) by which an electrical impulse can be transmitted for the purpose of effecting an indicating operation; the means for effecting the operation of the counter C in dependence on the delivery of the articles to be counted, would include a circuit control switch for the electromagnet 6 and while this switch could be made to respond to the actual passage of the articles themselves it could be operated by a component which in its movement is related to the passage of the articles. Thus, in the particular case where the invention is applied to counting the printed products as they pass from a printing machine to a delivery pile, the winding of the electromagnet 6 could be energised through remote control by a switch arrangement actuated by the printing cylinder (or some part synchronised with it) of the printing machine from which the products to be counted are delivered. However the switch could be actuated by a mechanical transmission although the remote electrical control arrangement is preferred by reason of its flexibility.

The indicating operation regulated by the counting mechanism described may take different forms but one particular application will now be described where the indicating operation consists in inserting strips of paper between cer-

tain printed products as they pass to a delivery pile from a printing machine.

Reference is now made to the mechanisms shown in Figures 5–8 in which an electromagnet 42 (the circuit of which is initially energised by the impulse following upon the closing of the three switches S and the switch 30) has an armature 43 which is pivoted at 44 and has at its forward end a pawl 45 engaging a ratchet wheel 46 fast with a feed roller 47 with which engages a co-operating feed roller 48; the slip (which may be of paper) being fed as indicated at 49 between these two rollers, the forward end of the strip abutting against a cutting blade 50 which co-operates with a ledger blade 50', and a blade spring 51 engaging in the teeth on the ratchet wheel 46 to prevent reverse movement on that wheel. It will now be seen that when the electromagnet 42 receives an impulse by the closure of the switches S and 30, the armature 43 is drawn upwardly and this results in causing rotation of the roller 47 by the operation of the pawl 45 in the teeth 46. In order to continue this operation for a time sufficient to advance the requisite length of strip material 49, the circuit of the electromagnet 42 when once energised by the impulse referred to is maintained by a repeater circuit operating in the manner of the familiar bell circuit. For this purpose there is fast with the ratchet wheel 46 and roller 47 a disc 52 having a recess 53 in which is normally received a tongue 54' on a blade spring 54 having a contact 55 to engage a contact 56 on a blade spring 57, the two contacts 55, 56 being in this position held apart as is shown and these contacts forming a switch in the circuit of the electromagnet 42.

When the ratchet 45 is caused by the initiating impulse applied to the electromagnet 42 to move the disc 52 the recess 53 is moved out of register with the tongues 54' and the clearance between the contacts 55, 56 is reduced. There is also provided a block 58 pivoted at 59 and having a recess 60 receiving a pin 61 on the armature 43 the nose of the block having a finger 58' to control the position of the blade 57. When this armature is attracted upwardly by the electromagnet the block 58 is rocked about its pivot 59 to allow the blade 57 to move away from the blade 54 and so prevent the contacts 55, 56 from closing. When however the originating impulse has ceased so that the armature 43 is returned under the action of a spring 43' to its normal position then the pin 61 takes up its lost motion in the slot 60 and this causes the block 58 to rock and in turn to move the blade 57 towards the blade 54 and so to re-make the circuit. This operation will continue the armature being vibrated up and down and this in turn causing the feeding movement of the roller 47 until when the recess 53 again registers with the tongue 54' the blade spring 54 is allowed to move away from the blade 57 and so finally interrupts the circuit to bring the feeding operation to an end.

For the purpose of severing the strip when the required length has been advanced the operation of the knife 50 is controlled by a cam 62 having a swell 63 with an abrupt end and controlling a pin 64 on an arm 65 pivoted at 66 which at its forward end has a projection 66' engaging under the pivoted blade 50. This swell 63 during the latter part of the rotation of the feed roller 47 rocks the arm 65 to lift the blade 50 and allow the forward end of the strip 49 to pass between the blade and the ledger 50' and then at the moment that the tongue 54' drops into the recess 53 (that is at the end of the strip feeding operation) the abrupt end of the swell registers with the pin 64 and allows the arm 65 to rock back and so to allow the blade 50 quickly to drop to effect the severing operation. The mechanism described for feeding and severing the strip is conveniently housed within a casing 67 which could if desired be formed as indicated in chain dotted lines 68 with a recess to accommodate a roll of strip feeding material which is taken between the rollers although this roll may be accommodated on a separate bracket.

Referring now to Figure 9, there is illustrated a modified arrangement in which instead of employing the pawl and ratchet mechanism described in Figures 5–8, there is employed a small electric motor to drive a feed roller 70 between which and a second roller 71 the strip 49 is taken through a guide 69. A disc 72 fast with the roller 70 has a recess to accommodate a locking pin 73 on a lever 74 pivoted at 75 and urged by a spring 76 to bias the roller against the periphery of the disc 72. A blade spring 77 on the lever 74 has one contact member 78 of a switch the other contact 78' of which is constituted by the core of an electromagnet 79 which is energised by the initiating impulse already referred to. When this impulse is received the contact 78 is attracted to the core of the electromagnet 79 and this operation lifts the roller 73 out of the recess in the disc 72. This operation frees the disc from restraint and the engagement between the contacts 78 and 79 closes the energising circuit of the motor which is thus rotated; the roller 73 now rides upon the disc 72 which prevents the contacts 78, 78' from opening by the action of the spring 76 until the recess in the roller 79 again registers with the pin 73 whereupon the spring 76 is allowed to operate to separate the contacts 78, 78' and the motor comes to rest. The operation of the motor has resulted in rotation of the feed disc 70 and hence of the feeding of the paper strip to the severing knife indicated at 80. This knife 80 is also controlled by the movement of the lever 74 which at its forward end enters into a slot in the knife 80 so that when the lever is rocked by the initiating impulse applied to the electromagnet 79 the knife is raised to allow the strip material to pass below it. When, as has been described, the pin 73 is allowed again to drop by its register in the recess in the disc 72, then this knife operates to sever the leading portion of the strip which has been fed forward.

In a modified arrangement, only a single wheel-type of counter is employed and each counter is provided with an operating cam and with a spring which is loaded as the wheel is advanced during the count; the series contacts to be controlled by the cams on the counter wheels are carried by supports adjustable about the counter wheels so that to effect a pre-setting the supports are adjusted to the required position; when the various wheels of the counter reach (during the count) a position corresponding to that of the supports, then the various cams operate the switches to close the series circuit through the contacts for the purpose of say inserting by means of the apparatus of Figures 5–9 a slip in the delivery pile or stack; at the same time the springs are rendered operative to return the counter wheels to the starting position.

In another modification which relates more especially to the strip feeding mechanism the strip may be cut from a length of material and

taken by a gripper device which can grip the leading end of the strip and then swing to deposit the severed slip on to the articles on the delivery pile. Here again also the mechanism for operating the cutting arrangements of the gripping device would be under the control of the switch mechanism regulated by the counting mechanism described.

Instead of severing the slips from a length of material, pre-cut slips may be employed.

What I claim is:

1. A counting mechanism for controlling an electric circuit and comprising in combination a counting device comprising a plurality of counter wheels, gearing interconnecting the wheels, means to advance the counting wheels in relation to the passing of the articles to be counted, a pre-setting device comprising a plurality of wheels equal in number to the wheels of the counter, means to set the latter wheels to a normally stationary setting corresponding to the number of articles to be counted, a corresponding plurality of electric circuit-control switches in series, an operating cam associated with each of the wheels of the counting device and of the pre-setting device, and a plurality of switch operating elements each bridging the cams associated with corresponding wheels of the counter and of the pre-setting device, the said operating elements rendering the switches operative only when the cams of the counting device reach a position corresponding to the position of the cams of the pre-setting device.

2. A counting mechanism for controlling an electric circuit and comprising in combination a counting device comprising a plurality of counter wheels, gearing interconnecting the wheels, means to advance the wheels as the articles to be counted pass, a pre-setting device comprising a plurality of wheels equal in number to the wheels of the counter, means to set the latter wheels to a normally stationary setting corresponding to the number of articles to be counted, a corresponding plurality of electric circuit control switches in series each switch comprising opposed blade springs, an operating cam associated with each of the wheels of the counting

device and of the pre-setting device, a plurality of pivoted switch operating components each controlled conjointly by the two cams associated with the corresponding wheels of the counting device and the pre-setting device and each component having a contact strip disposed between the two blades of the switch to engage both only when the two cams are in a corresponding position.

3. A counting mechanism for controlling an electric circuit and comprising in combination a counting device comprising a plurality of counter wheels, gearing interconnecting the wheels, a constant stroke pawl and ratchet mechanism to advance the counting wheels in relation to the passing of the articles to be counted, a pre-setting device comprising a plurality of wheels equal in number to the wheels of the counter, means to set the latter wheels to a normally stationary setting corresponding to the number of articles to be counted, a corresponding plurality of electric circuit-control switches in series, an operating cam associated with each of the wheels of the counting device and of the pre-setting device, and a plurality of switch operating elements each bridging the cams associated with corresponding wheels of the counter and of the pre-setting device, the said operating elements rendering the switches operative only when the cams of the counting device arrive at a position corresponding to the position of the cams of the pre-setting device.

OTTO EDLER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,869,999	Cary	Aug. 2, 1932
2,122,710	Bidwell et al.	July 5, 1938
2,219,636	Schwartz	Oct. 29, 1940
2,295,968	Poole	Sept. 15, 1942
2,340,743	Griffith	Feb. 1, 1944
2,365,645	Matthews	Dec. 19, 1944