

Anderson et al.

[15] **3,702,925**

[45] **Nov. 14, 1972**

[54] **SIGNATURE COUNTER**

[72] Inventors: **Bruce J. Anderson; Charles R. Noegel**, both of Miami, Fla.

[73] Assignee: **Electronic Design & Services, Inc.,**
Hialeah Gardens, Fla.

[22] Filed: July 1, 1971

[21] Appl. No.: 158,702

[52] U.S. Cl.....235/98 R, 235/98 B, 235/92 SB

[51] **Int. Cl.**.....G06m 7/06

[58] **Field of Search**.....235/98 B, 92 SB, 92 PK;
209/74; 271/68; 93/93 C, 93 DP

[56] **References Cited**

UNITED STATES PATENTS

1,544,860 7/1925 Reisbach.....235/98 B

1,841,711 1/1932 Cannon.....235/98 B

Primary Examiner—Stephen J. Tomskey

Attorney—Sidney G. Faber et al.

[57] **ABSTRACT**

Signatures moving in a substantially continuous stream

and arranged in overlapping fashion, folded edge forward, pass beneath the counter to activate a signature interceptor mounted with a self-cleaning housing. The interceptor, in turn, drives a cam which activates a cam follower each time a signature passes beneath the interceptor. The cam follower moves an interrupter blade whose positioning alters the magnetic field of a magnet means to control the operation of a switch means providing a switch closure for each signature counted. The cam, cam follower, intercept blade, magnetic field generating means and hermetically sealed switch means are mounted within a separate independent housing maintained in a dirt-free condition whereas the compartment receiving the intercept member is kept dirt-free by virtue of the manner of its operation. The counter housing acts to deviate the signatures from their normal plane of movement immediately after having been counted to facilitate the accuracy of the counting operation regardless of the thickness of the signatures. Spring means may be positioned to the side of the signature stream opposite said counter to eliminate the need for critical adjustment and positioning of the counter relative to the signature stream.

13 Claims, 16 Drawing Figures

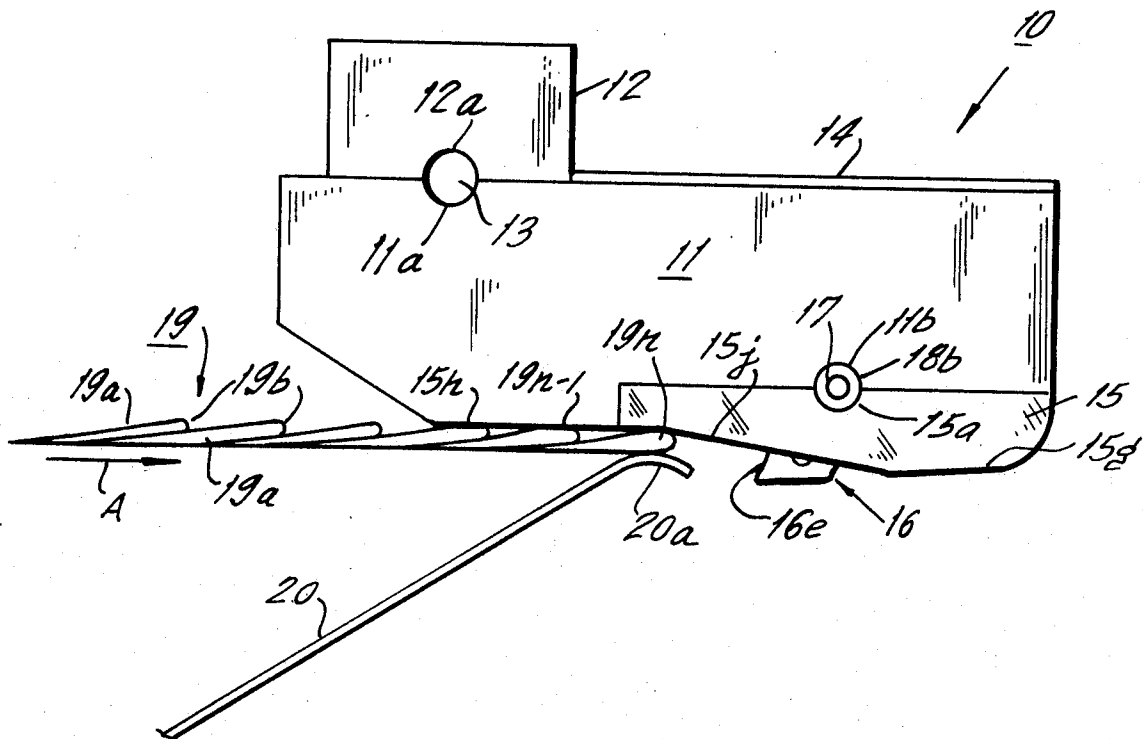


FIG. 1a.

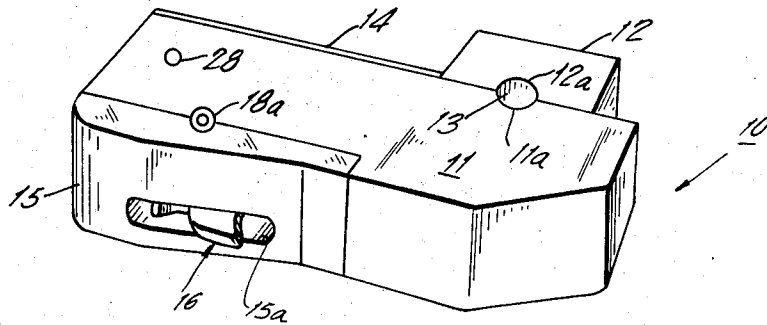


FIG. 1b.

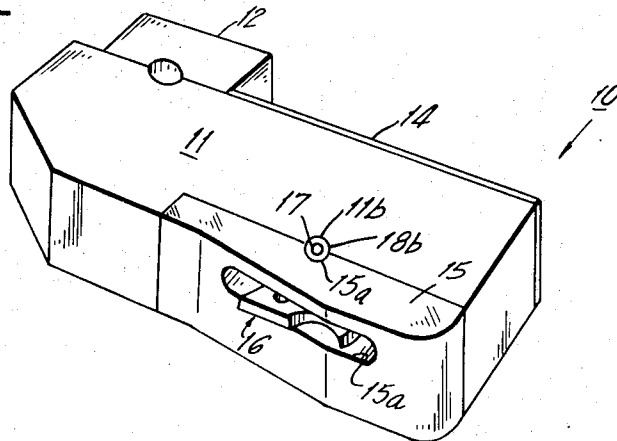
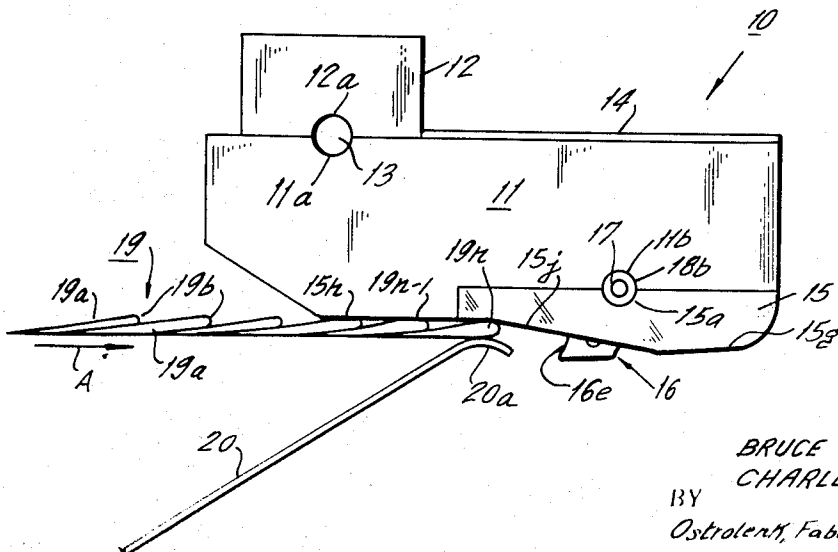


FIG. 5.



INVENTORS
BRUCE J. ANDERSON
CHARLES R. NOEGEL
BY
Ostrolentz, Faber, Gerb & Soffen

ATTORNEYS

FIG. 2a.

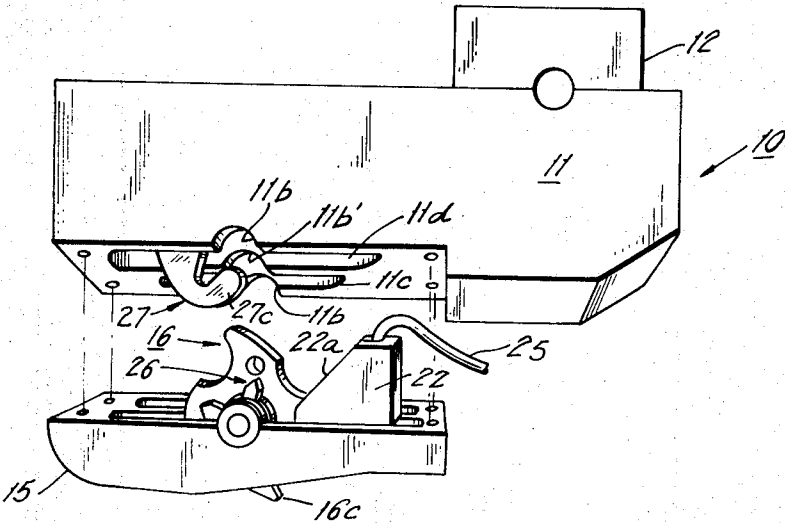


FIG. 2c.

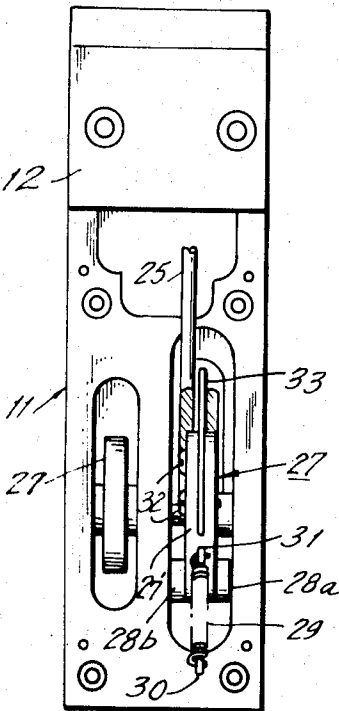


FIG. 2b.

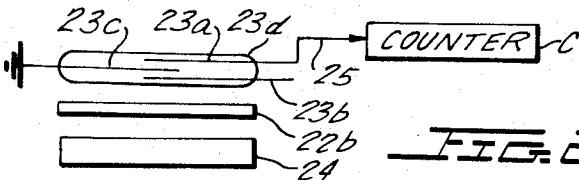
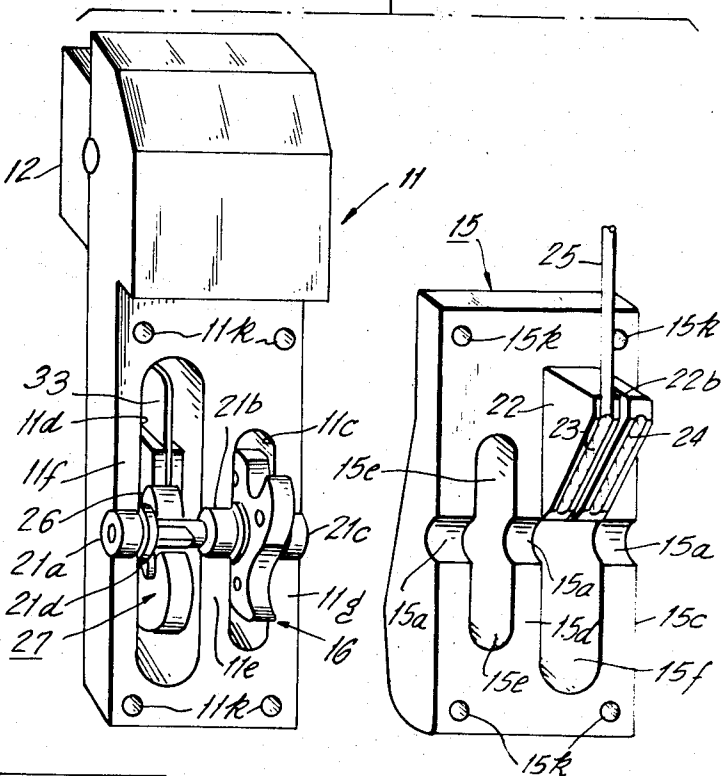


FIG. 2d.

INVENTORS
BRUCE J. ANDERSON
CHARLES R. NOEGEL
BY
Ostrolenky, Faber, Gerb & Soffen
ATTORNEYS

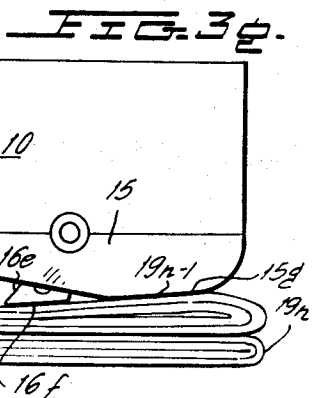
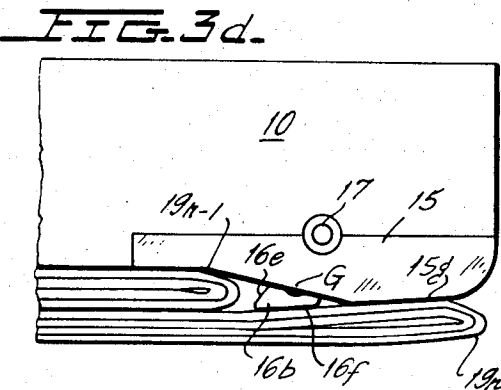
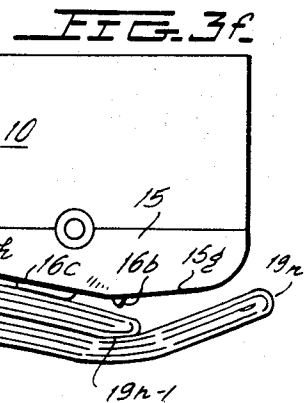
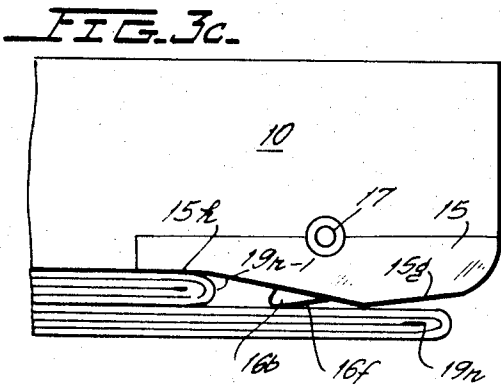
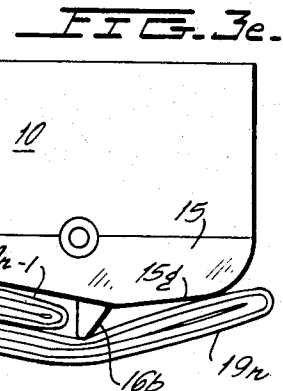
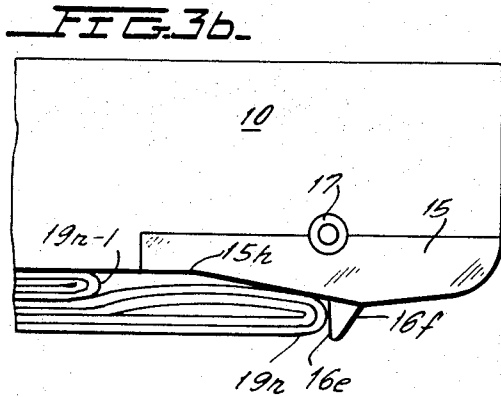
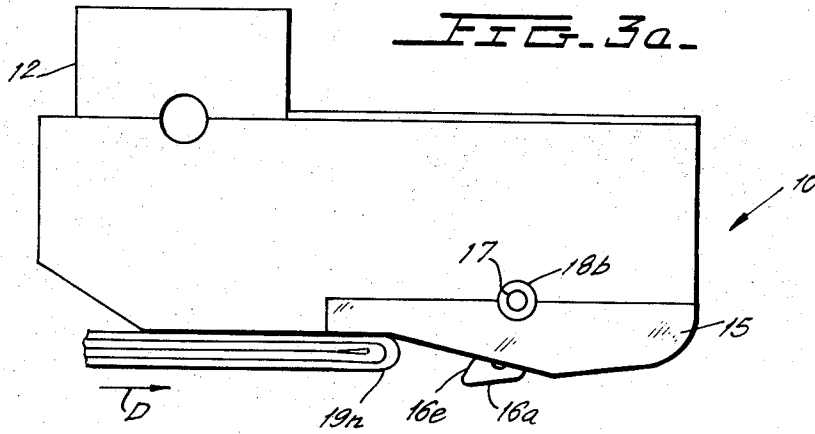


FIG. 4a.

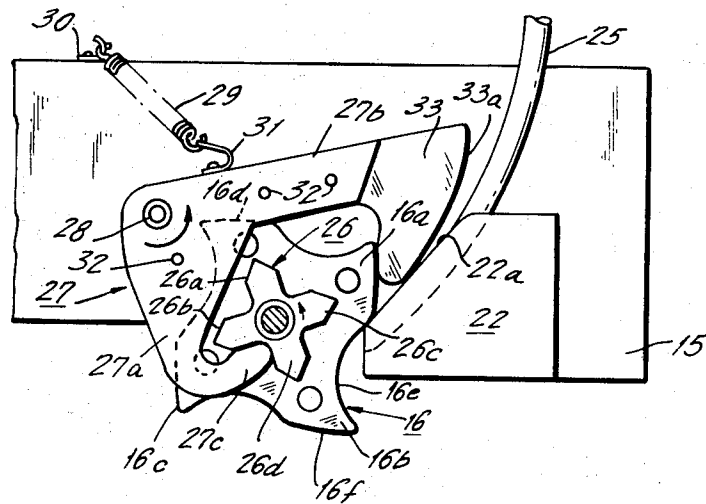
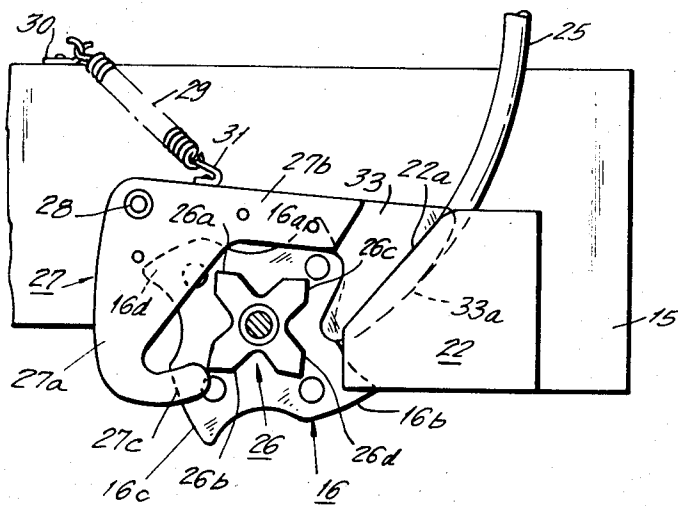


FIG. 4b.



INVENTORS
BRUCE J. ANDERSON
CHARLES R. NOEGEL

BY

Ostrander Fisher, Gorb & Sutter

ATTORNEYS

SIGNATURE COUNTER

The present invention relates to counting means and more particularly to a novel counting device for counting signatures and the like moving at pressed speeds of up to 80,000 signatures per hour, and which is adapted to provide an accurate count regardless of the thickness of the individual signatures.

BACKGROUND OF THE INVENTION

The present invention is particularly adapted for advantageous use in the graphic arts industry and particularly in the newspaper and magazine publishing industry. Signatures such as, for example, newspapers, are printed at very high press speeds, which may be of the order of 80,000 per hour and are subsequently transferred from the press room to a remote location, typically referred to as the "mail room," wherein the signatures are counted, stacked and bundled for subsequent delivery to stores, newsstands and the like.

Counters are typically employed to accurately determine signature count in order to accurately control the separation of the signature stream into bundles having an accurate and predetermined quantity of signatures. The signatures typically move along a conveyor or stream arranged in overlapping fashion with the leading edge forward. Conventional counters typically utilize the leading edge to effect a count. The most satisfactory counters which are presently in use employ either a cog wheel actuated by the leading edge of the signatures or employ a series of radially aligned spring-loaded pins either of which devices are actuated by the leading edges of the signatures.

In most instances, counters of this type provide satisfactory performance. However, several conditions exist which can affect the successful and accurate operation of the counters. One important factor which significantly affects counter operation is the size of the signature. Signatures can vary from as few as 4 pages to as many as 130 pages (4 pages consist of single full page folded in half and quartered). In such cases the thickness of each signature can vary from 1/32 to 3/4 inch. In each case the counter must be capable of accommodating the signature stream without adjustment.

In counters employing cog wheels, the papers are squeezed or forced under the cog wheel. In instances where the counter is being utilized to count thin signatures at high speeds an overcount or "cam over" has been found to occur due to the inertia of the spinning cog wheel. Magnetic detents have been employed to overcome this problem but the tendency of "cam over" is still nevertheless present.

In counters employing spring-mounted pins, the pins ride up and down on the signature stream in accordance with the thickness of the product. Initial adjustment of the counter relative to the signature stream is quite critical and considerable difficulty in obtaining highly accurate count is experienced in applications in which a wide range of paper thickness must be accommodated.

Another factor affecting accurate and reliable operation is the moving speed of the signature stream. Signature streams may be moved or arranged from very slow speeds up to speeds of the order of 80,000 signatures per hour. At high speeds (i.e., in excess of 50,000 signatures per hour) counters of the conventional type have a tendency to "cam over" thereby creating an

overcount condition in which the counter erroneously counts more signatures than have passed therebeneath.

Another important factor affecting the successful operation of counting devices is the environment in which the equipment is utilized. In an atmosphere of ink and paper dust, conventional counters have been found to require periodic cleaning to insure continued operation. Counters employing spring-loaded pins are particularly affected by ink which creates a binding condition on the spring-loaded pins, typically requiring daily cleaning to prevent inaccurate operation or even complete failure of the counter.

BRIEF DESCRIPTION OF THE INVENTION

The present invention is characterized by providing an improved counting/sensing device which successfully overcomes the problems encountered in the operation of conventional counting devices as set forth hereinabove and which is simple in design and installation and provides long unattended use.

The counter of the present invention utilizes a housing divided into first and second independent compartments. The first compartment is adapted to rotatably mount an interceptor member which is caused to be rotated by the leading edge of a signature as it passes the counter housing. The rotation of the interceptor is transmitted to a cam follower through a cam means to thereby move the cam follower into an interrupt position against the biasing force of a spring biasing means. The cam follower moves an interrupter blade into the region of influence of a constant magnetic field produced by a magnetic field generating means thereby causing the switch actuation of a hermetically sealed reed switch. Further rotation of the interceptor causes the cam follower to become disengaged from the cam means whereby the cam follower is returned to its neutral position under the influence of the spring biasing means thereby returning the interrupter blade to its neutral position. This operation is completed before the leading edge of the next signature engages the interrupter.

The interceptor is provided with a plurality of radially spaced projections whereby the next projection is moved into the intercept position in readiness for engagement by the leading edge of the next signature.

The shape of each interceptor projection acts to provide a "sledding" effect as the counted signature passes beneath the next interrupter projection to thereby prevent the possibility of a "camming over" regardless of the thickness or velocity of the signature stream. The counter housing confronting the signature stream causes the last counted signature to be somewhat deviated from its normal plane of movement so as to create a gap between the last counted signature and the next signature to be counted so as to thereby facilitate accurate operation of the counter over a full range of paper thickness since the gap created even during operation with a signature stream comprised of extremely thin signatures creates a gap of sufficient magnitude to enable the interceptor projection to sense a leading edge of very small thickness.

The counter is preferably mounted above the signature stream at a height sufficient to permit clearance of the signatures of the greatest thickness anticipated with a minimum of deflection or downward pressure upon

the stream. Thinner signatures are deflected upwardly by pressure applied from beneath the stream by means of a resilient (leaf) spring means having a pre-set mounting arrangement which eliminates critical mounting and adjustment of both the spring and the counter device.

The compartment containing the signature interceptor is designed to be self-cleaning and is thereby unaffected by an environment of ink and paper dust. The compartment housing the cam, cam follower, magnetic field generating means and switch means is completely sealed independently of the interceptor compartment and is thereby unaffected by the surrounding environmental conditions.

OBJECTS OF THE INVENTION

It is therefore one object of the present invention to provide a novel counter structure for use in counting signatures and the like and which is designed to maintain count accuracy over a full range of paper thicknesses.

Another object of the present invention is to provide a counter for signatures and the like which is able to accommodate, with accuracy, signature streams at speeds in excess of 70,000 signatures per hour.

Another object of the present invention is to provide a counter for signatures and the like in which the signature interceptor and the counting mechanism assemblies are mounted within separate compartments which are unaffected by the surrounding environmental conditions as a result of the counting mechanism being mounted within a sealed compartment and the intercept chamber being designed so as to be self-cleaning.

Another object of the present invention is to provide a novel counter for counting signatures and the like in which the interceptor activated by the leading edge of the signatures in the stream is designed so as to prevent the occurrence of a "camming over" effect.

Another object of the present invention is to provide a novel counter to be used with signatures and the like in which the counter housing is designed so as to create a gap between the last counted signature and the next signature to be counted to facilitate counting accuracy by creating a gap between the aforesaid signatures and thereby enabling signatures of extremely thin size to be accurately counted.

BRIEF DESCRIPTION OF THE FIGURES

The above as well as other objects will become apparent when reading the accompanying description and drawings in which:

FIGS. 1a and 1b are perspective views showing a counter housing of the present invention (right side and left side views, respectively);

FIG. 2a is an exploded perspective view of the counter of FIG. 1 in which the internal parts are exposed;

FIG. 2b is an exploded perspective view showing the internal components of the counter of FIG. 1 at an angle different from that shown in FIG. 2a;

FIG. 2c is a plan view looking down at the top of the counter of FIG. 1 with the top portion thereof removed to expose the internal components;

FIG. 2d is a schematic diagram of the electrical components of FIG. 2b;

FIGS. 3a-3g are elevational views showing the respective sequential steps in the operation of the counter relative to the signature stream;

FIG. 4a is an elevational view of the counter with one housing portion thereof removed showing the position of certain components during the sequential step of FIG. 3a;

FIG. 4b is an elevational view of the internal components of the counter showing the position of the components when a signature is in the position as shown in FIG. 3b; and

FIG. 5 is an elevational view showing the relative position of the counter signature stream and spring biasing means when in the operating position.

DETAILED DESCRIPTION OF THE FIGURES

FIGS. 1a, 1b and 5 are external views of the sensor/counter 10 which is comprised of a main housing 11 having a semicircular groove 11a along its upper surface which cooperates with a mounting clamp 12 having a similar shaped semicircular groove 12a to form an opening 13 for receiving a suitable shaft or rod upon which the assembly 10 is secured.

A thin cover plate 14 is secured in any suitable fashion to the upper surface of housing 11 so as to seal the components contained therein. A second cover member 15 is mounted to the underside of main housing 10 for sealing one compartment in said housing (not shown in FIGS. 1a, 1b and 5, and to be more fully described hereinbelow). Cover member 15 is provided with an elongated opening 15a which provides for the free rotation of interceptor 16 to be described more fully hereinbelow.

The lower edge of main housing 11 is provided with a semicircular shaped groove 11b which cooperates with a similar semicircular shaped groove 15a to form a circular opening for rotatably mounting a shaft 17 which rotates within a pair of bearings 18a (FIG. 1a) and 18b (FIGS. 1b and 5).

The signature stream 19 is comprised of a plurality of signatures 19a which pass beneath the counter assembly 10 in a direction shown by arrow A. The signatures 19a are arranged in overlapping fashion with their leading edges 19b being the first to pass beneath the counter. Typical spacing between leading edges is of the order of 1.5 to 2 inches. The signature stream is fed by conventional conveyor means, for example, such as spring belts (not shown for purposes of simplicity) which may be entrained about cooperating rollers (also not shown for purposes of simplicity) so as to form conveyors or conveyor sections for moving the signatures in overlapping fashion passed the counter. Similar conveyors may be employed both above and below the signature stream with the spring belts being arranged in spaced parallel fashion in the direction of signature movement so as to enable leaf spring 20, positioned beneath the lower conveyor, to engage the underside of the passing signatures and further so as to enable the underside of sensor/counter 10 to slidably engage the signatures as they pass therebeneath. Leaf spring 20 is preferably one to two inches in width, has a curved free end 20a and acts to urge the signatures upwardly against the underside of the sensor/counter 10 in a manner to be more fully described.

FIGS. 2a and 2b show the sensor/counter 10 of FIGS. 1a, 1b and 5 with the lower housing portion 15 being removed from its normal mounting location. From these exploded views it can be seen that the main housing portion 11 is provided with a first cavity or compartment 11c and a second cavity or compartment 11d which compartments are separated by a barrier portion or wall 11e. As was previously described, the outer walls 11f and 11g are provided with semicircular grooves 11b. Barrier wall 11e is similarly provided with a semicircular groove 11b' which semicircular groove cooperates with similar semicircular grooves 15a provided in the outer walls 15b and 15c of housing portion 15. A center barrier or wall 15d is provided with a similar semicircular shaped groove 15a'. Housing portion with an elongated opening 15e which cooperates with the compartment 11c of main housing portion 11 to form the compartment for receiving the interceptor member 16. An elongated recess 15f is provided between center barrier 15d and side wall 15c which cooperates with the compartment 11d to which seals the counting mechanism components (to be more fully described) therein. Main housing 11 is provided with openings 11k adjacent each corner for receiving elongated threaded members (not shown for purposes of simplicity). The threaded ends of the fastening means threadedly engage tapped openings 15k in housing portion 15 to secure housing portion 15 to main housing 11. The heads of the threaded members act to secure plate 14 and member 12 to main housing 11.

As was previously described, a shaft 17 is mounted within the cooperating semicircular shaped grooves 11b-15a, 11b'-15a' and 11b'-15a'. Shaft 17 is journaled within suitable bearings 21a, 21b and 21c mounted within the aforementioned cooperating semicircular grooves. Each of the bearings is provided with a flange portion 21e, 21e and 21f, respectively. Bearing 21a is snugly fit within its cooperating semicircular grooves with flange 21d being positioned within compartment 11d. The flanges 21e and 21f of bearings 21d and 21c, respectively, are each positioned within compartment 11c.

Housing portion 15 is provided with an upwardly extending mounting member 22 having one inclined surface 22a which is provided with a pair of elongated recesses (not shown) one of which houses a reed relay assembly 23 and the other of which receives a permanent magnet member 24. An elongated slit 22b is positioned between the reed relay 23 and permanent magnet 24 for selectively receiving an interceptor blade, to be more fully described. Reed relay 23 is coupled to a cable 25 to associate an electrical circuitry which recognizes the contact closure by generating a signal each time a signature is sensed. While not shown for purposes of simplicity, it should be understood that the signals accompanying contact closure may be accumulated by an electromagnetic or electronic counter which in turn is typically adapted to generate a signal after a predetermined count has been accumulated to operate a stacking device for forming the stacking bundles of a predetermined count. Typical equipment of this type is shown and described in U.S. Pat. Nos. 3,429,239 and 3,507,492 which are incorporated herein by reference thereto.

FIGS. 2c, 2d, 4a and 4b, taken into consideration with FIGS. 2a and 2b, show in detail the components housed within the first and second compartments of the sensor/counter.

Considering firstly the paper interceptor assembly, the interceptor member 16 can be seen to be provided with four projections 16a-16d arranged substantially at 90° angles relative to one another. The interceptor member 16 is provided with a centrally located opening which is force-fitted to shaft 17. Each of the projections 16a-16d is provided with an intercept surface 16e and a "runner" surface 16f which surfaces function in a manner to be more fully described. The interceptor member 16 is force-fitted to shaft 17 so as to cause the rotation of the shaft simultaneously with rotation of the interceptor member 16 as it is urged into rotation due to engagement with the leading edge of a signature. As can clearly be seen from FIG. 2b, the shaft 17 extends the width of the main housing 11 so as to pass through both compartment 11c and 11d. The portion of the shaft passing through compartment 11d has mounted thereon a cam member 26 which can best be seen in FIGS. 4a and 4b and which is comprised of four projections 26a-26d arranged at right angles relative to one another. Each of the projections have tapered free ends. The cam member 26 is provided with a centrally located opening which is force-fitted upon shaft 17 so as to rotate in unison with the rotation of intercept member 16 and shaft 17. A cam follower 27 is mounted upon a shaft 28 which is secured to one side wall of main housing 11 (note FIG. 1a) extends across the compartment 11d and is secured to barrier wall 11e. Spacers 28a and 28b are mounted upon shaft 28 and serve to centrally locate cam follower 27 within compartment 11d. The cam follower is provided with first and second arms 27a and 27b. The free end of arm 27a is provided with a substantially C-shaped end portion 27c which cooperates with cam member 26 in a manner to be more fully described. The cam follower 27 pivots about shaft 28 and is normally urged in the direction shown by arrow B of FIG. 4a by means of a biasing spring 29 having a first end secured to the main housing portion by a mounting clip 30 and having a second end secured to arm 27b by mounting clip 31. The cam follower in actuality is comprised of a first and second cam follower member 27 and 27' secured together by fastening means 32, as shown best in FIGS. 2c and 4a. Sandwiched between the members 27 and 27' is an interrupter blade 33 having a substantially V-shaped configuration with one arm thereof being secured between the respective arms 27b of members 27 and 27' and with the remaining arm extending outwardly from the free end of arms 27b. As shown best in FIG. 4a, with the mechanism in the neutral position, it can be seen that the edge 33a of interrupter blade 33 lies a slight distance away from the diagonally aligned surface 22a of mounting member 22.

The rotation of signature interceptor member 16 caused by the leading edge of a signature moving against one projection thereof, causes rotation of shaft 17 and cam 26 which in turn rotates the cam member in the direction shown by arrow C of FIG. 4a to urge one arm of the cam member against the C-shaped portion 27c of the cam follower so as to rotate the cam follower 27 in a direction opposite to that shown by arrow

B so as to move the cam follower from the position shown in FIG. 4a, and against the force of spring biasing means 29, to the position shown in FIG. 4b. In this position it can be seen that the outer edge 33a of the interrupter blade 33 enters into the slot 22b (note especially FIG. 2b) between the permanent magnet member 24 and the reed switch 23.

FIG. 2d shows a detailed circuit diagram of the operation in which the reed switch is comprised of first and second contacts 23a and 23b and a third contact movable contact 23c. With the interrupter blade in the position as shown in FIG. 4a (i.e., removed from slot 22b) the magnetic field established by permanent magnet member 24 urges contact 23c into engagement with contact 23b. With interrupter blade in the position shown in FIG. 4b (i.e., with its edge 33a positioned within slot 22b), the magnetic field is interrupted causing the contact 23c to be free of the magnetic field so as to be disengaged from contact 23b and urged into engagement with contact 23a. This contact closure may then be employed as a means for advancing the count of a counter C to advance its count by 1. If desired, the contact 23b may be omitted.

As shown in FIG. 2b, the permanent magnet member 24 and the hermetically sealed reed switch which is housed within a glass envelope 23d are retained within the recess provided within member 22 by an epoxy or any other suitable means.

FIGS. 3a-3g show the sequential operating steps of the sensor/counter 10. Considering first FIG. 3a, the first signature delivered to the sensor/counter, i.e., signature 19n, is urged against the underside of main housing 11 by means of the conveyor (not shown) supporting the signature stream as well as the leaf spring member 20, shown best in FIG. 5. Assuming that signature 19n is the first signature to be delivered to the counter, the counter will be in the neutral position with one paper intercept arm 16a being in the position shown in FIG. 3. Arrow D indicates the direction of travel of the signature. FIG. 4a shows the position of the internal mechanism at this time. It can be seen that the cam follower is in its neutral position with the magnetic field exerting maximum influence upon the reed switch 23.

FIG. 3b shows signature 19n which has now progressed to the point where contact has been made with the signature engaging surface 16e of projection 16a so as to slightly rotate the projection against the entire paper intercept member 16 from its position as shown in FIG. 3a. As was previously described, cam member 26 has also been partially rotated. The next signature 19n-l can be seen to come in view as can be seen in FIG. 3b. At this time the cam follower has been moved by cam member 26 to the position shown in FIG. 4b wherein the forward edge of the interrupter blade 33 has entered into the slot 22b between the reed relay and the permanent magnet causing a contact closure between contacts 23a and 23c.

FIG. 3c shows signature 19n which has been progressed from the position shown in FIG. 3b so as to cause the next projection 16b to extend out of its recess. The shape of each projection is significant in that a "sledding" effect is created by the flat surface 16f of each projection as each signature slides therebeneath. The "sledding" effect eliminates the pos-

sibility of "camming over" regardless of paper speed or thickness since the surface 16f "slides" upon the engaging surface of signature 19n and is prevented from experiencing any further rotation.

FIG. 3d shows the next signature 19n-l just prior to engagement with the signature engaging surface 16e of projection 16d. It can clearly be seen that the shape of the underside of the counter/sensor acts as a guide to control the movement of the signatures as they pass beneath the counter. From a consideration of FIG. 3d it can be seen that the lowermost surface 15g of housing portion 15 lies in the same plane as the flat surface 16f of interceptor projection 16d. The region between surface portion 15g and 15h of the counter housing is joined by a slightly diagonally aligned surface 15j which urges each signature slightly downwardly as it passes the region occupied by the paper interceptor member 16. The arrangement of initial contact area 15h of the paper guiding undersurface of the counter, which lies in a higher plane than the rear portion 15g, is very significant in that a gap or separation G is created between the signatures 19n and 19n-l. This is particularly important when counting extremely thin signatures where a very slight leading edge is encountered thereby permitting the counter to accommodate a full range of paper sizes. The operation is such that when a signature occupies the position of that designated by numeral 19n in FIG. 3c or 3d, the signature is urged to a plane which lies slightly below the plane of signature 19n-l creating the necessary gap which effectively improves the counting operation.

FIG. 3e shows the next step in the counting operation in which signature 19n-l has engaged paper intercept projection 16b to move it from the position shown in FIG. 3d to the position shown in FIG. 3e. In this position another contact closure operation has occurred as a result of the interceptor member 16 having rotated shaft 17 which in turn has rotated cam 26 to move cam follower 27 from the position shown in FIG. 4a to the position shown in FIG. 4b. The passage of second signature 19n-l is thus detected.

FIG. 3f shows the next progressive step in the operation in which signature 19n-l has almost, but not quite driven interceptor projection 16b into the housing and has thus caused interceptor projection 16c to have its "runner" edge 16f engage the confronting surface of signature 19n-l. As the signature 19n-l moves slightly further toward the right it will engage surface 15g of the housing to create the gap G, referred to hereinabove, in connection with FIG. 3d, so as to facilitate counting of the next signature following signature 19n-l. FIG. 3g shows the signature 19n-l after it has passed beneath housing surface 15g with the paper interceptor projection 16c having its surface 16f engaging confronting surface of the signature. The next signature to be counted will cause the operation to be repeated in the manner set forth hereinabove. Additional signatures have been omitted from FIG. 3g for purposes of simplicity.

The counter is preferably rigidly mounted by a suitable rod and is positioned above the signature stream which, as was previously described, is fed between upper and lower conveyor means. The mounting arrangement is quite simple in that the counter is positioned in the same plane as the signatures and is ad-

justed in height to permit clearance of the largest signature anticipated with a minimum of deflection or downward pressure being exerted by the underside of the housing upon the signature stream. The largest signature should make light contact with the front portion 15h of the signature guiding surface.

Thinner signatures are deflected upward by pressure applied from beneath the signature stream by the leaf spring 20, shown best in FIG. 5, which has a pre-set mounting arrangement eliminating critical mounting and adjustment thereof.

It can be seen from the foregoing description that the present invention provides a novel arrangement for counting signatures moving at high delivery speeds while eliminating the main shortcomings of conventional counters through the following features:

The counter is capable of maintaining count accuracy over a full range of paper thicknesses due to the unique shape of the paper interceptor member which cooperates with the paper guide surface of the counter as well as the leaf spring member in handling signatures of varying thickness without adjustment of the mechanism. The unique shape of the interceptor member provides a "runner" surface which cooperates with the lowermost surface 15g of the housing to provide a sledding action which prevents "overcamming," i.e., which prevents the counter from counting more signatures than have passed therebeneath. Embodiments of the type described herein have been found to accommodate, with great accuracy, signature streams operating at speeds of the order of 80,000 signatures per hour.

The compartment 11d housing the counting mechanism is completely sealed and is thus totally unaffected by environmental conditions such as ink and paper dust. The nature of the paper intercept compartment is such that the rotation of the paper interceptor member 16 within the compartment provides a self-cleaning feature which causes any dirt or dust entering into the compartment to be driven out by the operation of the paper interceptor.

Whereas the preferred embodiment described herein teaches a counter as being mounted above the signature stream with the paper interceptor member extending downwardly therefrom, it should be understood that the counter may be mounted at any other angle, such as vertically or horizontally whereby it is positioned beneath a signature stream. In the case where the counter is mounted beneath the signature stream so that the intercept member projects upwardly from the counter housing, the cover plate 14, shown best in FIG. 5, may be provided with an elongated slot which is of the shape of and which is aligned with recess 11c so as to enable any dirt or dust entering into the housing to pass through the recess 11c to pass out of the suitable opening (not shown) provided in cover plate 14.

Although there has been described a preferred embodiment of this invention, many variations and modifications will now be apparent to those skilled in the art. For example, the permanent magnet 24 and reed relay 23 may be replaced by a microswitch or a pair of contacts, one being a fixed contact and one being a sliding or movable contact normally biased to an open (or closed) position. The interrupter blade 33 may be replaced by a suitable projection adapted to activate

the microswitch (or sliding contact) to perform a counting operation. Therefore, this invention is to be limited not by the specific disclosure herein but only by the appending claims.

What is claimed is:

1. Means for counting an overlapped stream of signatures and the like comprising:

a housing, one surface of said housing having a recess;

a signature interceptor rotatably mounted within said recess, said interceptor having radially aligned projections each extendable beyond said surface as said interceptor is rotated;

said counter being positioned adjacent said stream whereby the projections of said interceptor are engaged by the forward edges of said signatures to be urged into rotation;

said housing having a closed compartment positioned adjacent said recess;

switch means mounted within said compartment;

means coupled to said interceptor for activating said switch means each time said interceptor rotates through a predetermined angle.

2. The counting means of claim 1 wherein said projections are spaced at predetermined equal angles about the axis of said interceptor;

said projections each having a first signature engaging surface and a second runner surface;

said first and second surfaces being diagonally aligned to one another to form a configuration at the free end of each projection which tapers to a point;

only one of said projections extending outward and beyond said housing surface when said counting means is in a neutral non-counting state;

the first surface of said outwardly extending projection being aligned transverse to said signature stream when said counting means is in said neutral state whereby the forward edge of the next signature engages said first surface to rotate said interceptor in a first direction.

3. The counting means of claim 2 wherein said second surfaces of said interceptor projections are aligned to selectively slidably engage the confronting surface of the signature whose leading edge has driven the interceptor into rotation to prevent rotation of said interceptor beyond a predetermined angle.

4. The counting means of claim 2 wherein the rotation of said interceptor by engagement of the leading edge of a signature drives the outwardly extended projection into said recess and rotates the next projection toward said driving signature;

said projection surface being aligned to slidably engage the confronting surface of the driving signature and thereby terminate the rotation of said interceptor until the leading edges of the next signature in line strikes the first surface of the projection just emerging from said recess.

5. The counting means of claim 1 wherein said switch means has a first and a second position;

magnetic field generating means positioned adjacent said switch means for maintaining said switch means in said first positions;

said activating means comprising means for interrupting said magnetic field when said interceptor is rotated.

6. The counting means of claim 1 further comprising a shaft for mounting said interceptor at one end thereof;

said activating means comprising:

cam means mounted near a second end of said shaft;

pivotably mounted cam follower means having a cam follower arm engageable with said cam to be driven in a first direction away from its neutral position when said cam is rotated;

bias means coupled to said cam follower means for urging said cam follower means toward said neutral position when said cam follower arm is released from said cam;

said cam follower means having a second arm;

an interrupter member secured to said second arm;

magnetic field generating means for normally urging said switch means into a neutral position;

said interrupter member being movable to interrupt the magnetic field of said magnetic field generating means to move said switch from said neutral position when said cam follower means is rotated by said cam.

7. The counting means of claim 1 wherein said housing surface is comprised of first, diagonal and second surface portions;

said first and second housing surface portions being respectively on the upstream and downstream sides of said diagonal surface portion as determined by said signature stream;

said housing first surface portion being further removed from said signature stream than said housing second surface portion to exert less squeezing pressure on the signature stream than said housing second surface portion, whereby said diagonal surface portion gradually increases the squeezing pressure exerted upon signatures as they move from the housing first portion toward the housing second portion.

8. The counting means of claim 7 wherein said second surfaces of said interceptor projections are aligned to selectively slidably engage the confronting surface of the signature whose leading edge has driven the interceptor into rotation to prevent rotation of said

interceptor beyond a predetermined angle.

9. The counting means of claim 8 wherein said housing second surface portion is substantially coplanar with the runner surface of the outwardly extended interceptor projection when said runner surface slidably engages a signature.

10. The counting means of claim 9 wherein said recess communicates with said housing diagonally aligned surface portion.

11. The counting means of claim 1 wherein said housing is provided with means for urging the signature passing said interceptor in the downstream direction away from said housing to create a gap between that signature and the leading edge of the next delivered signature to facilitate rotation of the interceptor by the next delivered signature.

12. The counting means of claim 1 further comprising leaf spring means positioned on the side of said stream opposite said counting means for urging said signatures toward said housing at a substantially constant pressure regardless of signature thickness.

13. The counting means of claim 1 further comprising a shaft for mounting said interceptor at one end thereof;

said activating means comprising:

cam means mounted near a second end of said shaft;

pivotably mounted cam follower means having a cam follower arm engageable with said cam to be driven in a first direction away from its neutral position when said cam is rotated;

bias means coupled to said cam follower means for urging said cam follower means toward said neutral position when said cam follower arm is released from said cam;

said cam follower means having a second arm;

a projecting member secured to said second arm;

means for normally urging said switch means toward a neutral position;

said projecting member being movable with said cam follower means to move said switch means from said neutral position when said cam follower means is rotated by said cam.

* * * * *

45

50

55

60

65