March 17, 1936. H. C. ZENKE 2,033,969

COUNTING DEVICE

Filed Dec. 21, 1929 5 Sheets-Sheet 1

Fig. 1.

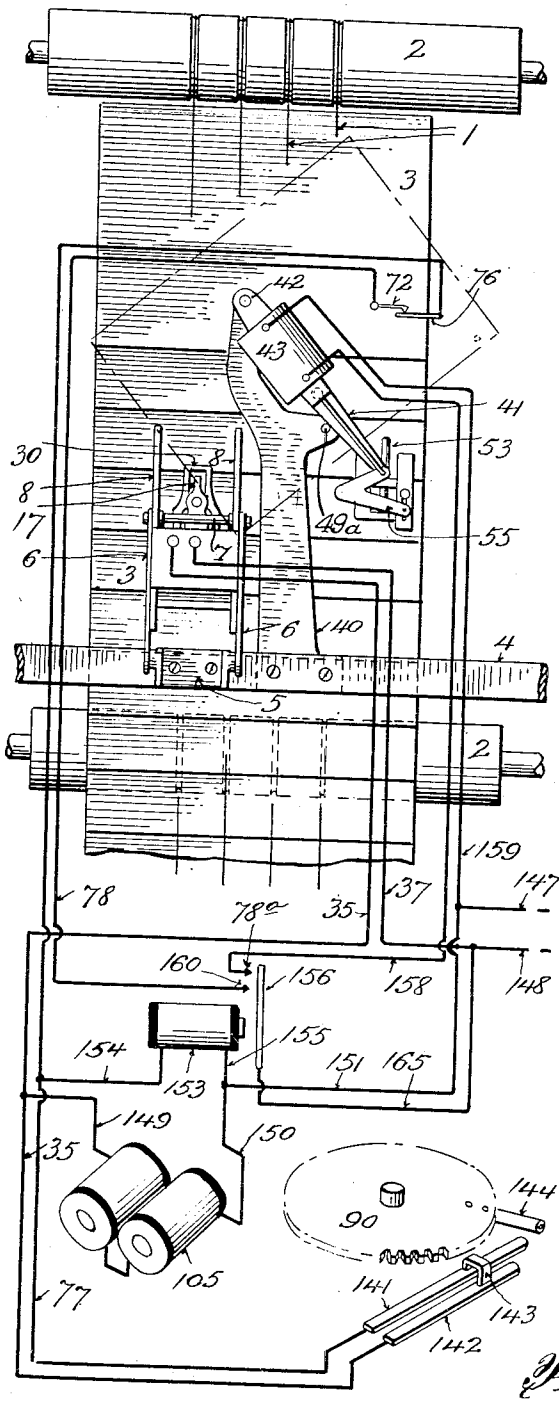
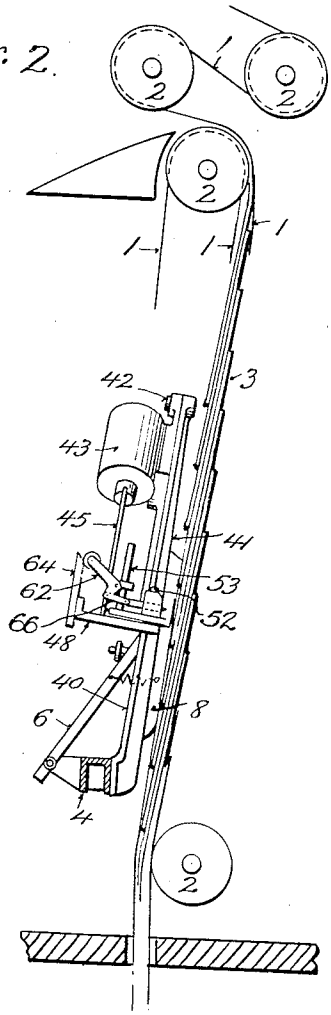
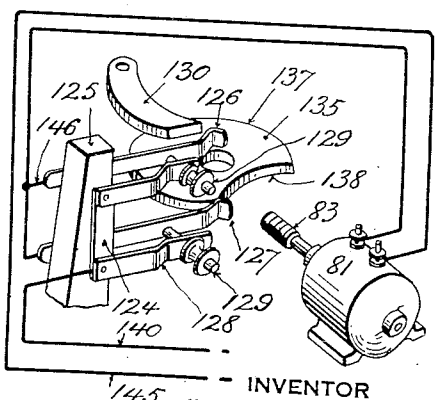


Fig. 2.





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Fig. 3.

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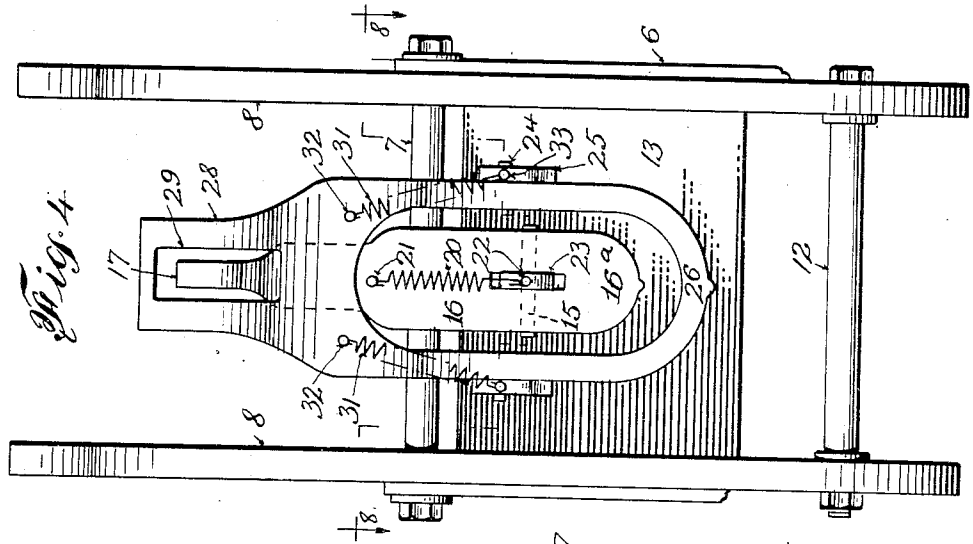


Fig. 4.

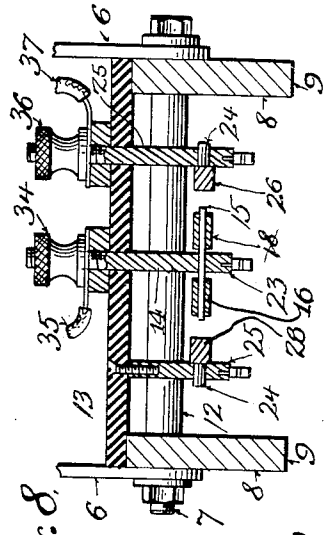


Fig. 8.

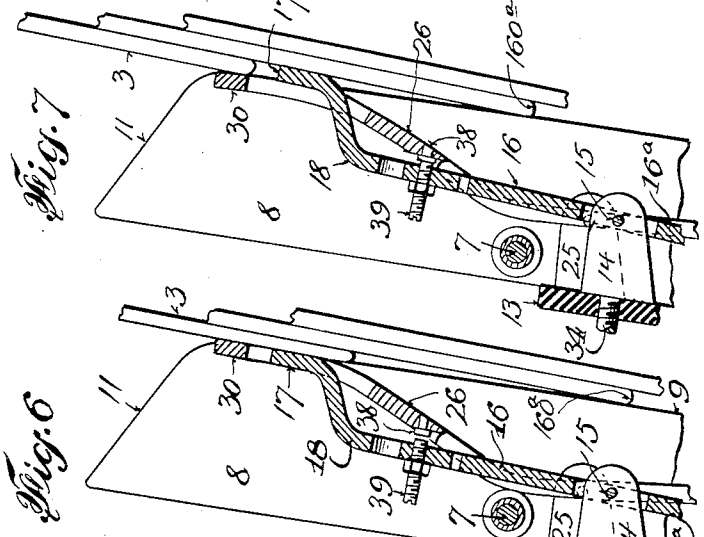


Fig. 7.

Fig. 6.

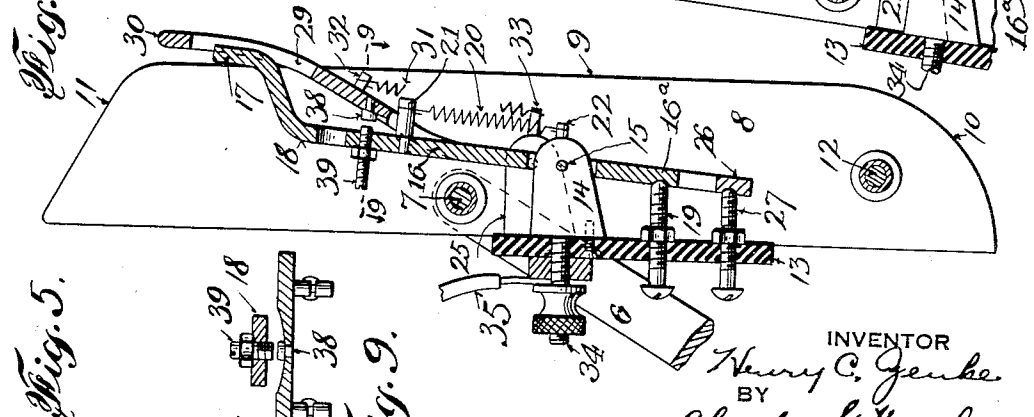


Fig. 5.

Fig. 9.

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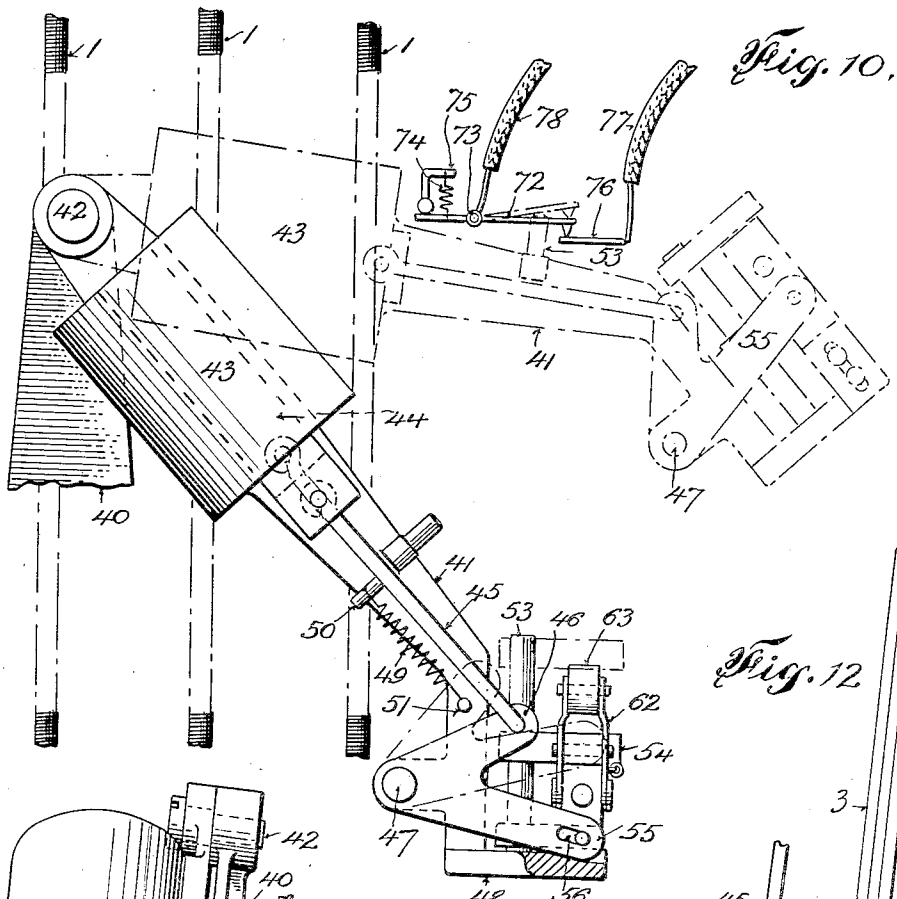


Fig. 10.

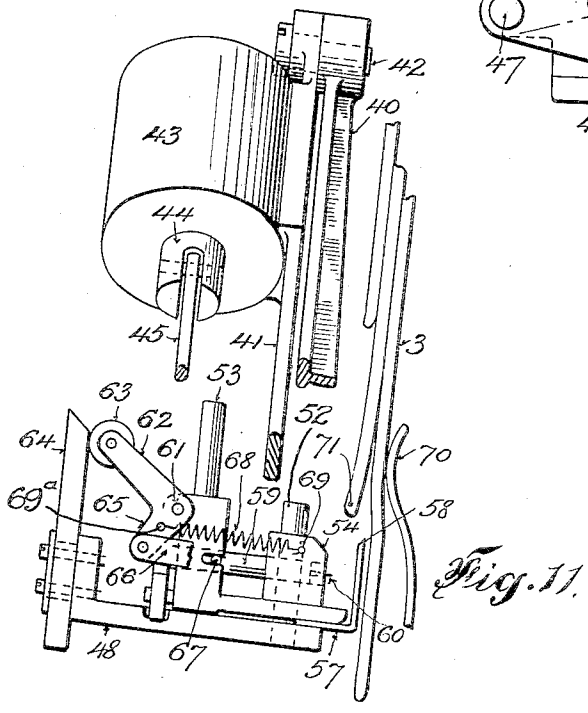


Fig. 11.

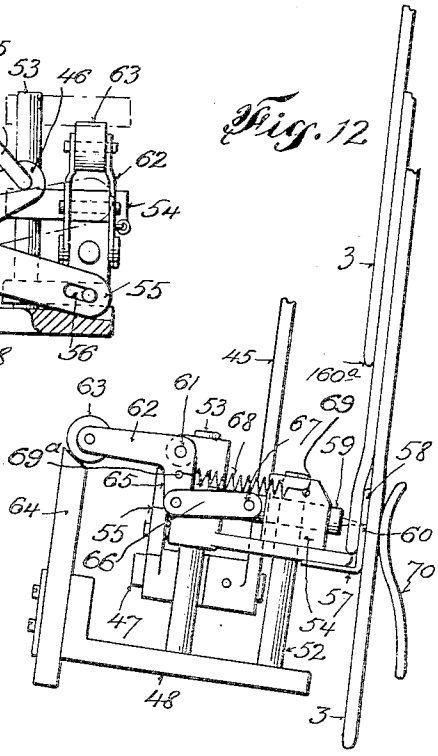


Fig. 12.

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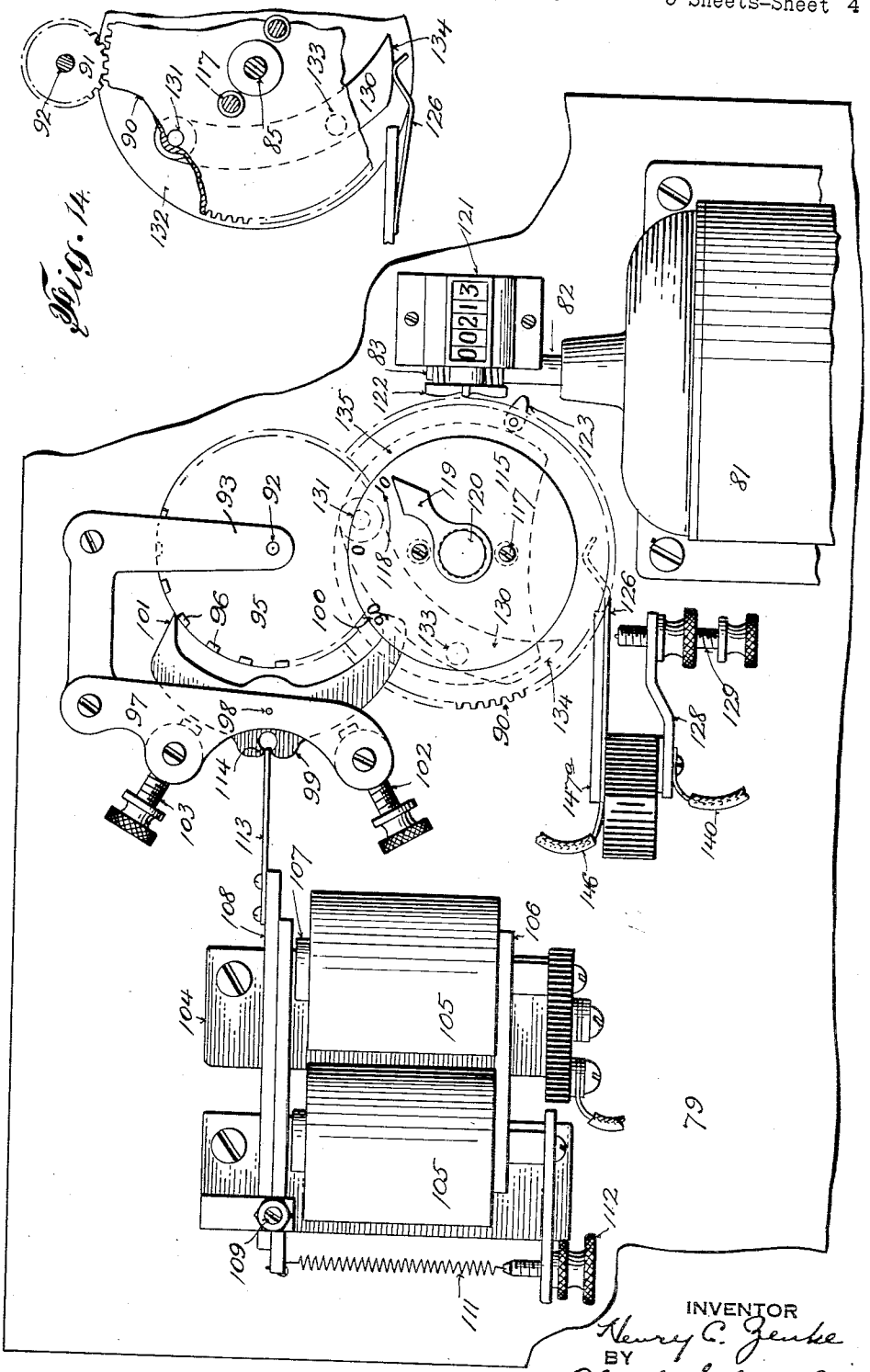


Fig. 14.

Fig. 13.

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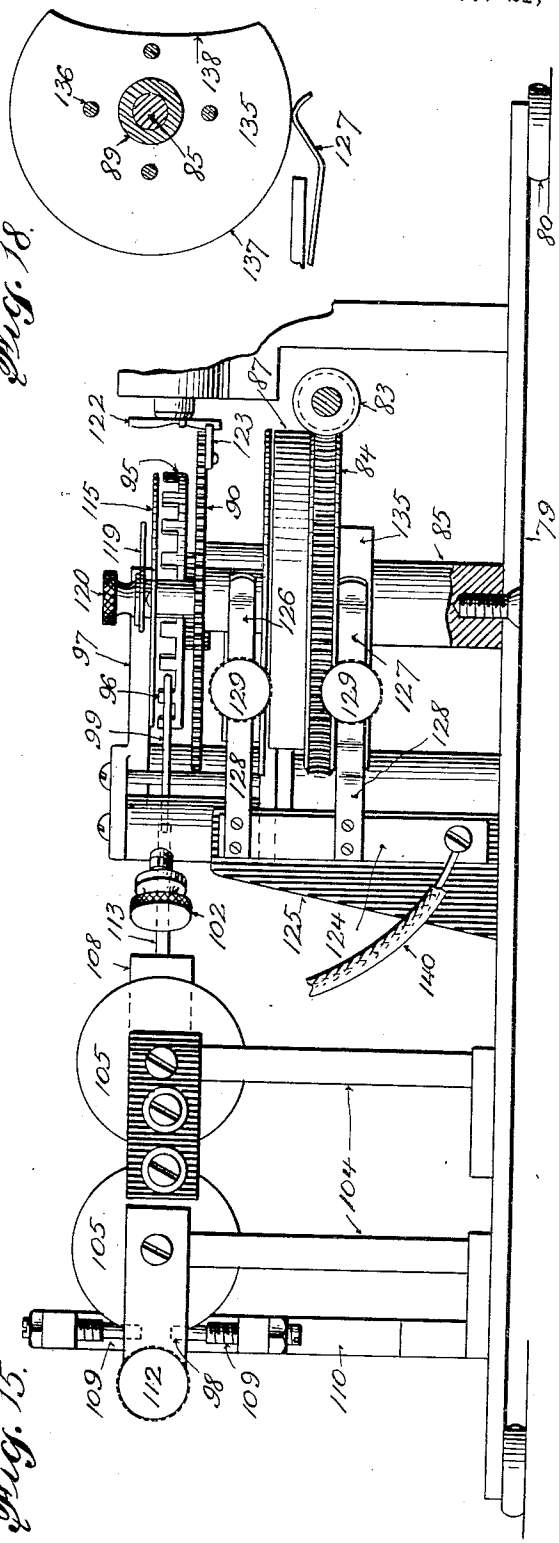


Fig. 15.

Fig. 18.

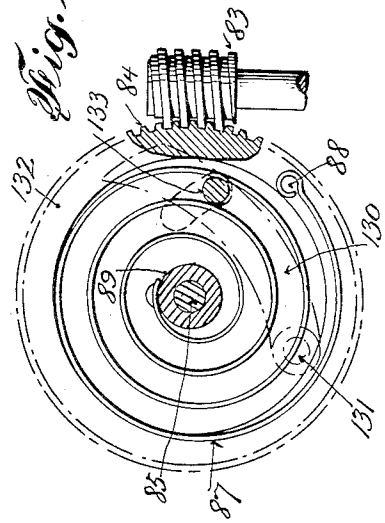


Fig. 17.

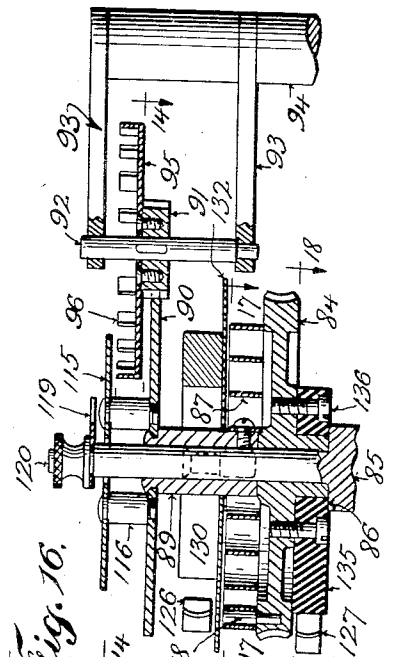


Fig. 16.

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UNITED STATES PATENT OFFICE

2,033,969

COUNTING DEVICE

Henry C. Zenke, Richmond Hill, N. Y.

Application December 21, 1929, Serial No. 415,657

4 Claims. (Cl. 235—92)

My invention relates to a device for counting articles, and while adapted for counting various kinds of articles, it is especially useful for counting newspapers or other printed matter. The present device may be employed to count newspapers while the same are travelling. In newspaper plants it is customary for the papers to be counted by a mechanism on the printing press as the papers are delivered in overlapping relation onto the conveyor, and every fiftieth or one hundredth paper is turned or shifted in relation to the remainder of the papers to form what is called a "kick sheet", so that a given number of papers will be grouped between successive kick sheets. The papers in overlapping relation with the kick sheet turned to indicate the count, are generally conveyed from the press on a belt or continuous conveyor to a separate room where the papers are bundled or tied into packages or otherwise distributed. In the distributing room the operators simply arrange the papers in groups of fifty or one hundred by taking the papers between wto consecutive kick sheets. It often occurs that the pressman, while the papers are being delivered from the press and being counted, will take a paper from those being delivered and counted, in order to observe the character of the work being turned out. That is, he may desire to observe the distribution of the ink and various other features of the printing.

The paper so removed by the pressman is not always replaced and it will result in shortage in one of the groups or bundles collected in the distributing room, as there will no longer be fifty or one hundred papers between two of the kick sheets where the pressman removed one of the papers. This results in claims from newspaper dealers for shortage and the publisher has no way of knowing when the claims are correct. The present apparatus may be employed to count the papers, preferably when they reach the distributing room rather than at the press, so that there will be a correct count of the papers reaching the distributing room; and any papers removed by the pressman in the press room will not affect the count in the distributing room. In the full embodiment of my invention it is not only possible to count the papers as they arrive at the distributing room but the apparatus is also adapted to kick a sheet after a given number of papers have passed the counter in order to indicate the count of the papers, so that the papers may be separated into bundles or groups having fifty or one hundred or any other required number of papers in each bundle or group. The apparatus is not only adapted to count the papers and to kick sheet, but the counting may be registered at a remote position from the point at which the actual count is made. The device which acts on the papers to initiate the counting may be in the distributing room, whereas the indicating or counting mechanism may be in the office of the person having charge of the plant, and this may be at a remote point from both the press room and the distributing room. The device is adapted to audibly indicate the count as well as to visibly indicate it on a counter or meter.

The apparatus includes a very novel and simple mechanism acting directly upon the travelling papers to initiate the counting of the papers passing the same, together with electrical means for transmitting impulses to an indicating device, which may be located at a remote position from the first mentioned device. In addition, there is a simple electrically operated means for kicking, periodically, papers called kick sheets for indicating the count, and this is associated with the counting device and is controlled thereby, preferably electrically. Other features and advantages of the invention will be set forth in the following detailed description of my invention.

In the drawings forming parts of this application,

Figure 1 is an elevation of part of the mechanism, showing the device which acts directly on the travelling papers to initiate the counting thereof, and the device for kicking sheets periodically, these being shown associated with the travelling conveyor, and parts of the electric circuit being shown diagrammatically,

Figure 2 is a side elevation of the parts shown Figure 1,

Figure 3 is a perspective view of circuit controlling members associated with the indicating device,

Figure 4 is a rear elevation on a large scale of the device which initiates the count of the papers,

Figure 5 is a horizontal, sectional view through the center thereof, showing the position of the parts when there are no papers passing under the detector,

Figure 6 is a similar view of a portion of the same device as shown in Figure 5, showing the positions of the feelers just before the edge of a paper passes under them,

Figure 7 is a view corresponding to Figure 6, but showing the circuit closed at the time one of the feelers passes or drops over the edge of a paper, leaving the other feeler still resting on the last paper,

Figure 8 is a sectional view taken on the line 8—8 of Figure 4,

Figure 9 is a sectional view taken on the line 9—9 of Figure 5,

Figure 10 is an elevation of the device for kicking sheets, the full line position showing the parts ready to start the kicking action, and the dotted line showing the same at the completion of the kick sheet movement,

Figure 11 is a side elevation thereof, with portions broken away for illustrative purposes,

Figure 12 is a side elevation of part of the device shown in Figure 11 but showing the parts in the position at the time the kick sheet is being gripped,

Figure 13 is a plan view of the device for indicating audibly and visibly the count of the papers,

Figure 14 is a sectional view taken on the line 14—14 of Figure 16,

Figure 15 is an elevation of the device shown in Figure 13,

Figure 16 is a vertical sectional view through the spring and gear device,

Figure 17 is a sectional view on the line 17—17 of Figure 16, and

Figure 18 is a sectional view on the line 18—18 of Figure 16.

The papers are delivered from a printing press in the press room to the conveyor which conveys them to the distributing room, and a portion of the conveyor is shown in the drawings. It consists of a number of endless belts or bands 1, of spiral or springlike construction, which travel over grooved rollers 2 arranged at various positions according to the path the papers are to travel; and the papers in overlapping position as shown at 3 in Figure 1 are engaged by these belts, some of which lie to the front of the papers while others lie at the back. Conveyors of this type are well known in the art and the application of my invention requires no modification of the conveyor. In the drawings I have shown the feeling or detecting device for initiating the count arranged to act upon the papers while they are travelling nearly vertically on the conveyor and just before the papers are delivered upon the bench or table in the distributing room. I will first describe the feeling or detecting device which is acted upon by the papers for the purpose of controlling the electric circuit which actuates the counting device.

I have shown a stationary supporting bar 4 disposed crosswise of and adjacent the path of travel of the papers while on the vertical run of the conveyor. There are pivotally mounted on the bracket 5 attached to this bar parallel arms 6 which extend upwardly from the bar and are connected by a shaft 7 on which is pivoted what I prefer to call a sled. This is a device which has a sliding contact with the travelling papers, the papers moving in relation to the sled so that the action is the same as if the papers were stationary, and the sled were travelling over them.

The sled, in the particular form illustrated herein, consists of the parallel runners 8 having edges 9 which rest upon and slide in relation to the surfaces of the papers; and both front and rear ends of the runners are curved, as shown at 10, 11 in order that the papers will not be dislodged from their positions on the conveyor. The two runners are clamped in parallel relation by the rods 12 which secure them in fixed, spaced relation and which also secure the insulating plate 13 between the runners to serve as a support and insulating member for the feelers.

There are brackets 14 mounted on the insulating plate and depending therefrom, on which there is pivotally mounted on the pintles 15 one of the feelers consisting of a rocking lever 16, one arm of which extends toward the bottom of the sled and is provided with a bent or offset end 17 which is adapted to come into direct contact with the moving papers. The other arm 16a of this lever is adapted to be limited in its movement in one direction by an adjustable set screw 19 which is mounted in the insulating plate 13, so that the lever can swing to the position shown in Figure 5 with the bent end 17 of the lever 16 extending below or beyond the edges 9 of the runners of the sled. This lever is urged to move into the position shown in Figure 5 by means of a coiled spring 20 having one end connected with a pin 21 mounted on the lever 16 and with a pin 22 mounted on the member 23. By means of this spring the lever 16, 16a is held in the position shown in Figure 5 with the arm 16a resting against the set screw 19. There is another lever pivotally mounted on the pintles 24 which are journaled in the brackets 25 which also are mounted on and depend from the insulating plate 13.

One arm of this lever is made in the form of a yoke 26 surrounding a portion of the lever 16 and the rear portion of this lever is adapted to engage against the adjustable stop screw 27 (which is also mounted in the insulating plate 13) in order to arrest the lever in the position shown in Figure 5. One arm of this lever 28 is provided with a cut out or opening 29 through which the curved end of the lever 16 is adapted to freely move without contact with the lever 28. The forward end 30 of the lever 28 is adapted to slidingly engage the traveling papers similar to the portion 17 of the lever 16 and at a point adjacent thereto. There are coiled springs 31 each having one end connected with a pin 32 on the lever 28 and their opposite ends are connected with the stationary pins 33 on the brackets 25 so that the lever 28 is urged to the position shown in Figure 5. The levers 16, 28 are preferably made of metal to be conductive of electricity and there is a binding post 34 mounted on the insulating plate 13 and in electrical contact with the bracket 14 and therefore in electrical connection with the lever 16. The wire 35 is connected to this binding post and is part of the electrical circuit which will be hereinafter described. There is a similar binding post 36 mounted on the insulating plate 13 and this is in electrical contact with one of the brackets 25 and therefore with the lever 28. The wire 37 connected with this binding post is also connected in the electric circuit which will be described in detail. The lever 28 is provided with a contact member 38 and the lever 16 is provided with an adjustable contact member 39, these two members being so located that they may come into contact with each other when the parts are moved into the position indicated in Figure 7, for the purpose of closing the electric circuit at this point.

The above constitutes the device for feeling the travelling papers and for periodically closing an electric circuit as each paper passes.

I will here describe the device which is adapted to kick the sheets for indicating the count of the papers so that each fiftieth or one hundredth paper, as the case may be, or any other number, will be changed in position in relation to the remainder of the papers in order to indicate the count and permit the operator to separate the

papers into bundles having a definite number of papers without the necessity of the operator counting the papers.

I have shown a bracket **40** mounted rigidly on the bar **4** extending upwardly at right angles thereto, this bracket forming a support for the movable parts of the kicking device. There is an arm **41** pivoted from the bracket **40** on the stud **42** so that the arm swings in an arc the plane of which is parallel or substantially parallel to the plane of the path of the papers on the conveyor. This arm has fixed upon it a solenoid **43** and in this solenoid there is a reciprocating plunger **44** which is operated magnetically when the winding of the coil **43** is energized. There is a connecting rod or pitman **45** pivotally connected at one end to the plunger **44** of the solenoid and the other end of this pitman is pivotally connected to one arm **46** of a lever which is itself pivoted on the stud **47**. This stud is fixed in a frame **48** which is integral with or mounted upon the outer end of the arm **41** and it is adapted to carry several devices which operate upon the papers. There is a coiled spring **49** having one end attached to the pin **50** on the connecting rod **45** and the other end attached to a pin **51** fixed in the frame **48**, the purpose of the spring being to withdraw the plunger of the solenoid and move the lever **46** in one direction, but the spring is of such tension that it may be overcome by the magnetic action of the solenoid.

The frame **48** carries parallel rods **52**, **53** fixed thereto, which form guides or tracks for a reciprocating slider **54**. This slider is adapted to be reciprocated along the rods **52**, **53** by the arm **55** of the lever previously described and which is actuated by the plunger of the solenoid, the lever arm **55** being connected by a pin and slot connection **56** with the slider, as shown in Figure 10. The slider is provided with a plate **57** having an angular portion or foot **58** which is adapted to be projected under the edge of one of the folded papers which travel with the conveyor, for the purpose of forming a platen, or back rest for the gripping of the edge of the paper. This slider also carries a reciprocating plunger **59** which I have shown provided with a piercing pin **60** adapted to pierce the paper when co-operating with the platen **58** as will be more fully set forth. This plunger **59** reciprocates toward and from the platen **58** and therefore toward and from the paper under which the platen is inserted. The plunger is adapted to reciprocate in the slider **54** and it is operated as follows: There is a bell crank pivoted at **61** to the slider and one arm **62** of this bell crank is provided with a roller **63** which engages one side and the end of a plate **64** mounted on and carried by the frame **48**, the slider moving in relation to this plate. The other arm **65** of the bell crank is pivotally connected to a short link **66** and the opposite end of the link is pivoted to a pin **67** on the plunger **59**. The bell crank is actuated in one direction by a coiled spring **68** having one end connected with a pin **69***a* on the arm **65** of the bell crank, and its other end is connected with a stationary pin **69** on the slider.

This spring, therefore, moves the bell crank in a direction necessary to maintain the roller **63** in contact with its actuating plate **64** and in this movement the spring also serves to move the plunger **59** in the direction necessary for the pin **60** to pierce the paper. The slider and the several parts associated with it, as well as the bell crank **62**, **65** are all adapted to swing with or as part of the arm **41** which carries the solenoid so that as the latter arm swings in the arc of a circle the various parts of the kicking device move with it, although some of them also partake of individual movements in relation to the arm. I prefer to provide a resilient finger **70** stationarily mounted to engage the travelling papers opposite the platen **58** at the time it is projected under the edge of a paper, in order to support the papers at this point, and also to press them in such manner that the folded edge **71** of the paper under which the platen is about to be projected, will be pressed outwardly away from the adjacent paper as indicated in Figure 11. This facilitates the entry of the free end of the platen under the edge of the paper which is pressed outwardly, as indicated in this figure. One of the guiding rods **53**, is extended so that when the arm **41** swings to the dotted line position shown in Figure 10, this rod will engage a pivotal contact arm **72** for the purpose of rocking it on its pivot **73** against the opposition of the coiled spring **74** which is fixed respectively to a stationary stop **75** and to one arm of the lever. This is for the purpose of moving the contact arm **72** away from the contact **76** in order to open or break a circuit between the wires **77**, **78**, for the purpose of deenergizing the solenoid **43** on the arm **41** at the time the parts arrive in the dotted line position of Figure 10.

I will here describe the devices which perform the counting operation and which register the same, these devices being shown more fully in Figures 13 to 18 inclusive. As stated in the preamble, the device which I am about to describe may be placed in any location desired in so far as the parts for feeling the sheets and for kicking the sheets are concerned. The only connections between the several devices required are the electric wires, so that the counting and registering devices may be located in the office or room of the superintendent of the plant, or whoever is to be informed of the number of papers being delivered to the distributing room. It will also be apparent that more than one counting and registering device may be operated by the same feeling device by simply connecting them in parallel in the circuits to be hereinafter described, so that if more than one person in different locations are to follow the count of the papers delivered, the several counting and registering devices may be operated from one feeling or detecting device.

I have shown counting and registering devices mounted on a base **79** which rests on the feet **80**. There is a motor **81** mounted on this base and its purpose is to automatically rewind the spring which actuates the escapement device and the counter and register. The shaft **82** of this motor is provided with a worm **83** which meshes with and operates a worm gear **84** which is mounted on a stationary post or shaft **85**, the hub of the gear resting upon the shoulder **86** of the post or shaft, and the post itself is mounted vertically on the supporting base **79** where it is secured by a screw. There is a coiled spring **87** similar to a main spring of a clock, although preferably having fewer convolutions, and this spring is mounted on the top of the worm gear **84** and surrounding the post **85**.

The outer end of this spring is connected with or looped around a pin **88** which is secured to the worm gear **84** and projects upwardly therefrom into the loop of the spring, as shown in Figure 16, so that the outer end of the spring is thus fixed to and movable with the worm gear. The inner

end at the inner convolution of the coiled spring is fastened by means of a screw to a sleeve 89 which rests upon the hub of the worm gear 84 and it is journaled on the post 85 to rotate freely in relation thereto under the control of the spring. On the upper end of the sleeve 89 there is secured in fixed relation a spur gear 90 which rotates with the sleeve and the teeth of this gear mesh with and operate the pinion 91 which is mounted upon a shaft 92. This shaft is mounted on the arms 93 carried by a support 94 which is also rigidly supported upon the base 79. There is integral with or fixed to the pinion 91 an escapement wheel 95 having upwardly extending teeth 96 spaced equal distances apart and on which the escapement lever is adapted to operate. There is a frame 97 mounted upon the base, and this frame forms a support for the pin 98 on which the escapement lever 99 is pivotally mounted in horizontal position. The escapement lever is provided with the dogs 100, 101 one on each arm of the escapement lever and these dogs engage alternately with the teeth 96 of the escapement wheel so that at each rocking movement of the escapement lever the escapement wheel is permitted to turn a distance of one tooth, the action corrsponding with the escapement device of a watch or clock in its operation. The extent of movement of the escapement lever in both directions is controlled by the set screws 102, 103 mounted in the frame 97 and against which the opposite arms of the escapement lever are adapted to engage to limit the oscillations of the lever.

In Figure 13 I have shown brackets 104 mounted on the base 79 and on the upper ends of these brackets there are mounted parallel coils 105 having a magnetic frame 106 to form with the coils an electromagnet. The frame of the magnet is brought out at one end in the form of pole pieces 107 so that the magnet acts on the magnetic armature 108. This armature is pivoted by means of the fulcrum screws 109 on a bracket 110 which is also supported from the base. The extended end of the armature lever is acted upon by a coiled spring 111 having one end connected with the end of the armature lever and the other attached to an adjustable screw 112 which is adapted to adjust the tension of the spring in order to regulate its action on the armature, so that it may be overcome by the magnetic pull of the electromagnet. The outer or free end of the armature has mounted thereon a resilient strap 113 which is shown secured to it by screws and the free end of this strap engages the pivotal points 114 formed on the back of the escapement lever. Each time the electromagnet is energized it pulls the armature lever 108 downwardly in Figure 13 against the opposition of the spring 111 and this serves to operate through the resilient strap 113, the escapement lever, rocking it in a counterclockwise direction. Each time the electromagnet is deenergizerd the spring 111 returns the armature lever, and this movement causes the escapement lever to move clockwise or in a reverse direction.

I have provided means for automatically initiating the operation of the motor for the purpose of rewinding the spring 87 and means for terminating the operation of the motor.

There is a plate 124, preferably of metal, fixed upon the supporting bracket 125, which latter is preferably made of insulating material. On the bracket 125 there are fixed two contact arms 126, 127 having free ends projecting toward the revolvable parts on the post 85. There are two arms 128 secured to the plate 124 and lying opposite each of the spring arms 126, 127 and in these are mounted adjustable contact screws 129 which are adjusted so that the contact arms 126, 127 will be normally out of contact with these contact screws, but they will be moved into contact therewith when actuated by the following described members. I have shown a lever arm 130 pivotally mounted on the post 131 which is carried by the plate 132 which is fixed to and movable with the revolving sleeve 89. This lever arm has a pin 133 which projects through the plate 132 and extends into the space between two adjacent convolutions of the main spring 87. The outer, curved edge 134 of the lever arm 130 is adapted to engage the spring arm 126 during its rotation with the plate 132 for the purpose of acting on the free end of this spring arm to move it into contact with the contact screw 129 for the purpose of closing an electric circuit at this point. The path of movement of the lever arm 130 is such that if the main spring is unwound to such an extent as to require rewinding, the pin 133 on this lever arm will be held by the adjacent convolutions of the main spring in such position that the curved end 134 of the lever 130 will press the resilient arm 126 over far enough to make contact with the contact screw 129. On the other hand, if the main spring is wound from a previous operation of the motor to such an extent that it does not require rewinding at the time the lever arm 130 approaches the resilient arm 126, then the pin 133 will be held by the convolutions of the main spring nearer the axis of the sleeve 89.

As a result the curved end 134 of the lever arm 130 will not move the contact arm 126 over sufficiently to make contact with the screw 129 at the time of passing it. In that event the lever 130 will make a complete revolution without initiating the operation of the rewinding motor and there will be sufficient energy stored in the main spring for a succeeding revolution. This arrangement prevents the motor from being started and from overwinding the spring when the latter is sufficiently wound for a succeeding revolution. The main spring will, therefore, not be overwound and broken by the motor.

The contact spring 126 is only held over by the lever arm 130 for a short period of time or insufficient to maintain the motor in operation for a complete rewinding action. It is intended that the motor when started, shall cause one complete revolution of the worm gear 84 which will ordinarily be sufficient to rewind the spring for one revolution of the dial 115. In order to maintain the operation of the motor after it has been started by the lever 130 for a period sufficient to permit the worm gear to be revolved one complete revolution I have provided the following: There is a cam disc 135 shown more fully in Figure 18, and this is preferably made of insulating material and it is secured to the under face of the worm gear 84 by means of the screws 136 so that it revolves as a unit with the worm gear. This disc has a circular periphery 137 for the major portion, with a recess or mutilation 138 extending over an arc which will cover a period somewhat greater than the period during which the curved end 134 of the lever 130 is in contact with the spring arm 126.

The cam disc 135 is adapted to act on the free end of the spring arm 127 so that when the periphery 137 of this cam disc is in contact with this spring arm, as shown in Figure 18, this arm will be held in contact with one of the contact screws 129 for the purpose of closing a circuit

at this point. The contact screws 129 which are mounted on the arms 128 are connected through the plate 124 with the same wire of the electric circuit, so that if either the arm 126 is in contact with its contact screw 129 or the spring arm 127 is in contact with its contact screw 129 the circuit through the wire 140 will be closed and also if both arms are in contact with their contact screws. In other words, the contact arms 126, 127 are connected in parallel in the circuit so that each performs the same function.

There is a dial 115 which is mounted on the gear 90 which, as previously described, is fixed to the rotatable sleeve 89, the dial being shown secured to the gear by means of the posts 116 which are screwed into the gear and the dial is secured to the posts by screws 117. The dial, therefore, revolves in unison with this gear; and it is provided on its top surface with a scale 118, corresponding, preferably, in subdivisions with the number of papers which are delivered between successive kick sheets.

In the drawings I have illustrated this dial as divided into one hundred divisions so that the dial will count up to one hundred papers for each revolution; but it is to be understood that the dial may be provided with a scale having any other number of divisions or subdivisions.

The number of divisions on the dial corresponds with the number of teeth on the escapement wheel 95. I have taken the number one hundred merely by way of simplifying the illustration and description of operation of the device. There is a pointer 119 mounted parallel with the dial 115, it being shown clamped against a shoulder on the upper end of the post 85 by means of the nut 120. This pointer remains stationary while the dial revolves in relation thereto and the position of the pointer in relation to the scale on the dial indicates the count of the papers passing into the distributing room. I have shown a counter or meter 121 stationarily mounted above the worm gear 83 and it has a star wheel 122 which is periodically actuated by means of a projection 123 mounted on the gear wheel 90 so that at each revolution of this gear, and therefore of the dial, the star wheel 122 will be turned one unit, and this will advance the number on the scale of the counter 121.

I will here describe the electric circuits which I employ.

In Figure 1 I have shown two contact members 141, 142 the lower one of which remains stationary and is provided with an arm 143 which reaches over the second contact member 141 disposed above the first one. On the gear wheel 90 which makes one revolution for each revolution of the dial I mount a pin 144 projecting laterally therefrom, which pin, during the revolution of the gear, lifts the free end of the contact member 141, the bottom of which is in an inclined plane to be in the path of the pin 144 so that the member 141 comes into contact with the member 143 in order to close a circuit which includes the two arms 141, 142. If the gear 90 is provided with one hundred teeth to correspond with one hundred counting divisions on the dial 115 then if there is only one pin 144 on the gear, the circuit will be closed between the arms 141, 142 for every one hundred papers passing the feeling device.

If it is desired to kick sheet every fiftieth paper, then there will be a second arm 144 arranged on the gear 90 opposite the first arm so that for each revolution of the gear contact will be closed twice between the arms 141, 142 so that the kick sheet device will be operated for every fiftieth sheet passing the feeling device.

Electric current from any source of supply, such as a lighting circuit, is fed to the apparatus here described by means of the wires 140, 145 carrying current of opposite polarities.

The wire 140 is connected with the plate 124 on which the arms 128 carrying the screws 129 are mounted. The wires 146 are connected to the arms 126, 127 and also to one pole of the motor 81. Current is fed to the motor whenever either or both arms 126, 127 are in contact with the screws 129. The circuit just described is preferably independent of the circuits to be hereinafter described.

Current is fed from any source of supply to the wires 147, 148 for distribution to various other circuits.

The wires 35, 37 which are connected with the binding posts of the feeling device are connected, respectively, with the wire 149 which runs to one of the connections of the counter magnets 105 and with the wire 148. The wire 150 connected with the opposite side of the electromagnets 105 is connected with the wire 151 which in turn is connected with one of the feed wires 147. A complete circuit for energizing the counting magnets may, therefore, be traced from the wire 148, through the wire 37, through the contact points 38, 39 of the feeling device, thence through the wire 35 and wire 149 to the counting magnets 105; through the coils of the latter, and thence through the wires 150, 151 to the opposite feed wire 147.

This circuit is adapted to be closed each time the feeler device is actuated by the moving papers to close the contact members 38, 39 which will naturally be each time a paper passes the feelers. This will result in the energizing of the counting magnets for each paper passing the feeler device and the escapement wheel 95 will therefore escape one tooth each time a paper passes the feeler. This will advance the dial 115 in relation to the pointer 119 thereby indicating the count of the papers on the dial. At each complete revolution of the dial, and of the escapement wheel, the projection 123 on the gear 90 will actuate the star wheel 122 and register the count on the meter 121. Where the dial 115 is divided into one hundred divisions, requiring one hundred operations of the magnets 105 for one revolution of the gear 90, the numbers on the meter 121 will represent hundreds of papers counted. For instance, the meter 121 in the position shown in Figure 13 represents twenty-one thousand, three hundred papers counted. The circuit above traced includes the feeler and the counting magnets, which latter are energized once for each time the circuit is closed by the feelers.

The wire 35 which is connected to one side of the feeler is also connected with one of the contact arms 142 shown in Figure 1. Another wire 77 connected with the other of these two contact arms is connected with one side of the electromagnet 153 through the branch 154 and the wire 155 connected with the other end of this electromagnet is connected with the wire 151 and through the latter to the wire 147.

A circuit may be traced, therefore, from the wire 148, through the wire 37, and contacts of the feeler device, through the wire 35, thence through the contact arms 142, 141 and when these are closed the circuit continues through

the wire 77 and wire 154, thence through the electromagnet 153 and the wires 155, 151 to the opposite feed wire 147. The electromagnet 153 is, therefore, energized when the contacts at the feeler are closed and when the circuit is closed between the contact arms 141, 142. This will occur at one revolution of the gear 90 if there is but one pin 144 on the gear, or at every hundred papers counted; or, it will occur twice for each revolution of the gear 90 if there are two such pins on the gear, or every time fifty papers pass the feeler. The wires 77 and 78 which are connected with the switch 72, 76 are connected respectively with the wire 154 and with a contact point 160 which is adapted to be touched by the armature 156 when attracted by the magnet 153. The wire 158 connected with one binding post of the solenoid coil 43 is connected with the contact point 78a which is also adapted to be touched by the armature 156 at the same time it touches the contact point 160; i. e., when the armature is attracted by the magnet 153. The wire 159 is connected with one post of the solenoid coil 43 and also with the feed wire 147.

When the magnet 153 is energized, which as above pointed out will occur only when contacts are closed at the feelers and at the arms 141, 142, the magnet 153 will attract the armature 156 so that it touches both contacts 78a and 160. When this occurs a circuit including the solenoid 43 may be traced as follows:

From the feed wire 147, through the wire 159 to one post of the solenoid 43; thence through the solenoid and through the wire 158 to the contact point 78a; thence through the armature 156 and wire 165 to the feed wire 148. Through this circuit the solenoid is energized to actuate the paper gripping device of the sheet kicker.

Under the same conditions another circuit may be traced as follows: From the feed wire 147 through the wires 151, 155; thence through the coil of the magnet 153, thence through the wire 154 and the wire 77 to one member 76 of the switch; from the arm 72 of the switch through the wire 78 to the contact point 160; from there through the armature 156 and wire 165 to the feed wire 148. This completes a circuit which includes the break switch 72, 76 and the magnet 153. The latter magnet was first energized when the feeler contacts and the arms 141, 142 were simultaneously in closed positions but the period during which this magnet was thus energized was not long enough to permit the kick sheet operation to be performed. But the completion of the second circuit through the magnet 153 above described, and which included the switch 72, 76 continues to energize the magnet 153 as long as the switch 72, 76 is closed even though the first circuit through the magnet 153 is broken either at the feelers or at the arms 141, 142. The second circuit serves as a hold over for the magnet 153 after the first circuit has made the second circuit possible.

For the solenoid 43 to be energized the contacts at the feelers and at the arms 141, 142 must be simultaneously closed for the magnet 153 to attract the armature 156.

This condition will exist at the time each fiftieth or one hundredth paper passes the feelers, according to the arrangement of the pins 144 on the gear 90. The circuit through the solenoid 43 will be broken if the switch 72, 76 is opened because the magnet 153 will be deenergized, and this will occur when the kick device completes its operation.

Operation

The operation of the apparatus will be as follows: Let it be assumed that the main spring 87 is wound or partly wound and that the device has been set into operation with a series of papers in overlapping position, travelling on the conveyor from the press where they are printed up to the distributing room, with the feeling device and kicking device operating near the conveyor in the distributing room. The sled will press lightly against one side of the overlapping papers travelling vertically or nearly vertically on the conveyor and as the folded edge 160 of a paper passes the feeler member 17 this member will drop from the level of the paper just engaged to the next succeeding one, as shown in Figure 7 or a distance substantially equal to the thickness of the paper passing the feeler 17. The edges 9 of the runners engage a plurality of papers at the same time, so that this edge rests on a plurality of the folded edges 160 of several papers at all times. Therefore, as the folded edge of each paper passes from under the end of the feeler 17, the latter is urged by its spring to drop the thickness of the paper until it strikes the paper underlying the one which just passed the feeler. The feeler 30 of the rocking lever 28 will be passed by the folded edge of the paper at a slightly later period than the same paper passed the feeler 17.

Temporarily, therefore, the feeler 17 projects to a different plane than the feeler 30 and this brings the contact members 38 and 39 of the levers 16, 28 into contact for the purpose of electrically connecting the wires 35 and 37. As soon as the advancing paper disengages or passes beyond the feeler 30 the latter will drop against the same paper which is engaged by the feeler 17 so that both feelers 17 and 30 will be in alignment as shown in Figure 6 and this will break the connection between the contact points 38, 39 and therefore open the circuit between the wires 35 and 37. From this it will be apparent that the contacts 38 and 39 are closed and again opened each time a paper passes the feelers 17 and 30. This causes the circuit above described and traced through the counting magnets 105 to be energized once for each paper passing the feeler.

The result of this action on the counting device may be traced as follows: As the magnets 105 are energized they draw over the armature 108 and this acts through the strap 113 to rock the escapement lever in one direction and as the magnets 105 are de-energized by the opening of the contacts 38, 39 the spring 111 returns the armature 108, thus rocking the escapement lever back to its original position. The complete movement of the armature 108 toward the poles of the magnet 105 and back again to starting position serves to rock the escapement lever and permit the escapement wheel to revolve one unit or the distance between two successive teeth. As the escapement operates, a sound like a telegraph key is made by the movement of the armature 108, so that a person in the vicinity of the counting device will have an audible indication of the papers counted.

In addition, the papers counted will be visibly indicated by the hand 119 on the dial 115 from one to a hundred. Each hundred papers counted will be registered on the meter 121. Thus the person in control of operations will have an audi-

ble and registered count of the papers which reach the distributing room. If any papers are removed from the delivery device in the press room it will not affect the count at the distributing room; that is, the count in the distributing room will be accurate as to the papers reaching there. The feeling device will be effective regardless of the speed at which the papers travel past it. No kick sheet device will be used on the press when the present device is operating.

As the escapement wheel is permitted to escape by the escapement lever its movement is actually caused by the main spring 87 which acts on the sleeve 89 to turn the gear 90. This also turns the escapement wheel 95 each time this is permitted by the escapement lever. As the escapement wheel revolves step by step the main spring is slowly unwound and at each revolution the lever arm 130 passes the spring arm 126. If the spring is still sufficiently wound so that an operation of the motor would wind it too tightly or injure it, then the pin 133 of the lever arm 130 will remain relatively nearer to the axis of the post 85 due to the condition of the convolutions of the spring; and in that case the lever arm 130 will not project far enough to press the spring arm 126 into contact with the screw 129 and in such event the motor will not be started for a rewinding operation during that particular revolution of the gear 90. But if the spring is unwound to such an extent as to require rewinding the arm 130 will extend out so that as it passes the spring arm 126 it will press the same into contact with the screw 129.

This will close the circuit between the wires 146, 140 and start the motor. As soon as the motor starts to operate the worm 83 turns the worm gear 84. While the spring arm 126 is still held against the screw 129 the cam 135 is turned with the worm gear 84 sufficiently to cause the high portion 137 of the cam 135 to press the spring arm 127 over sufficiently to make contact with the other screw 129. This also closes the circuit between the wires 146, 140 but the motor has been previously started by the lever arm 130. As the latter in its course of travel with the worm gear 84 leaves the spring arm 126 the motor circuit is not broken but instead the cam 135 maintains the spring arm 127 in contact with one of the screws 129 until the low portion 138 of the cam 135 reaches the spring arm 127, whereupon the latter is released from contact with the screw 129 and the motor circuit is broken at the arm 127, and the motor stops. Had the arm 130 not moved the arm 126 into contact with one of the screws 129 the motor would not have been started and therefore the cam 135 would not have been turned by the motor.

While the motor is in operation it preferably revolves the worm gear 84 one complete revolution or sufficient to rewind the main spring the same extent it was unwound by a previous revolution of the escapement wheel. These operations are repeated after each revolution of the escapement wheel which, in the construction illustrated, will be after each one hundred papers have been counted with the exception above noted. When the worm gear 84 makes a complete revolution in the above described operation the coils of the spring are moved toward the shaft 85 and the pin 133 which lies between two of the coils of the spring is moved inwardly, so that the arm 130 on which this pin is mounted is swung inwardly, and it will not extend far enough to hold the member 126 in contact with the member 129, and therefore the operation of the motor will cease until such time as the spring unwinds and the above described operations are repeated.

The counting operation takes place independently of, though it controls, the kicker operation. The counting device itself may be employed independently of the kicking device for its individual purpose.

As it is common to kick sheet for every fifty papers delivered let it be assumed that there are two pins 144 on the gear 90. Each time one of these pins approaches the arm 141 it lifts it until it makes contact with the member 143 on the arm 142 and it holds it there momentarily. When the fiftieth paper passes the feelers the contacts 38, 39 are closed and as the arms 141, 142 are in electrical contact current passes through the magnet 153 and energizes it, so that it draws over the armature 156 to the points 78a, 160. At this time the switch members 72, 76 are closed (their normal condition) and current therefore passes through and energizes the coil of the solenoid 43, in accordance with one of the circuits previously described.

At the time the above occurs, the lever arm 41 carrying the solenoid is in the lower or full line position of Figures 1 and 10. As the solenoid is energized its plunger is magnetically drawn upwardly against the resistance of the spring 49. At this time the folded edge of one of the papers on the conveyor arrives at the position shown in Figure 11 and it is pressed outwardly by the finger 70. As the plunger of the solenoid moves upwardly it acts on the lever arm 46 to rock the same and as the arm 55 swings with it on the pivot 47 it acts through the pin and slot connection 56 to advance the slider 54. This moves the foot 58 upwardly and under the projecting edge of the paper pressed out by the finger 70.

At the same time the slider makes this movement it carries the bell crank 65, 62 with it and the roller 63 passes over the edge of the cam plate 64 to the position shown in Figure 12.

As this occurs, the spring 68 rocks the bell crank 65, 62 and the link 66 drives the plunger forwardly to project the pin 60 through the corner of the paper where it is backed by the foot 58.

The arm 41 is free to swing upwardly on its pivot 42 and as the pin 60 grips one corner of a paper the paper, as it travels upwardly, moves the arm 41 with it. Owing to the arcuate movement of the arm 41 the pin 60 swings outwardly, and while the gripped paper moves the arm 41 upwardly the corner of this paper is swung outwardly to the dotted line position shown in Figure 1 and this forms what is called the kick sheet.

When the arm 41 reaches its upper position as shown dotted in Figure 10, the pin 53 strikes the switch arm 72 and moves it to break or open contact between the members 72, 76. As these members are connected in series with the magnet 153 in the hold over circuit this magnet is deenergized by the opening of the switch 72, 76. The armature 156 immediately moves away from contact 78a and the circuit through the solenoid is broken. At once the spring 49 returns the plunger of the solenoid, thus returning the slider 54 to its original position on the posts 52, 53 and the bell crank is returned to its former position by the member 64 and it withdraws the pin 60 from the paper. There is then nothing to hold up the arm 41 and it rapidly drops back by gravity to the full line position of Figure 10 where it

rests against the stop pin 49*a*, ready for a succeeding kick sheet operation.

As the solenoid is under the joint or co-operative control of the feelers and the members 141, 142 the kick sheet device (in the embodiment shown) will be operated once for each fifty papers if there are two fingers 144 on the gear 90, or once for every hundred papers if there is only one such pin 144.

It will be apparent from the foregoing that I have provided a simple and effective device for counting the papers apart from the press; that in the further embodiment of the invention I provide a kick sheet device which is under the control of the counting device.

While I have described one embodiment of my invention in great detail and with reference to numbers of various parts or elements, I deem the present invention to be broadly new and desire to include all modifications and equivalents which come within the scope of the following claims.

Having described my invention, what I claim is:

1. A device of the class described, including a sled with which a plurality of articles moving in relation thereto may simultaneously have a moving engagement and means for holding said sled so that it will have a sliding engagement with said articles said sled being adapted to float against the articles, feelers carried by said sled and arranged to successively engage one in advance of the other with said articles, said feelers being adapted to be moved in relation to each other as the articles pass the feelers, and counting means actuated by said feelers.

2. A device of the class described, including a sled and means for holding the same so that it has a movable engagement simultaneously with a plurality of articles moving in relation thereto, feelers carried by said sled and arranged to successively engage one in advance of the other with said articles, means for resiliently pressing said feelers individually against said articles, an electric circuit, and contact members actuated by said feelers under the control of said articles, for controlling said circuit.

3. A device of the class described, including means adapted to rest and to float against articles moving in relation thereto and proportioned to simultaneously engage a plurality of said articles, feelers carried by said means which engages the articles and arranged to engage said articles one in advance of the other whereby the relative positions of said feelers are altered as the articles move in relation thereto, and counting means operated by said feelers.

4. A device of the class described, including a sled having spaced runners for engaging against articles moving past said sled, pivotal means for holding said sled whereby said runners will have a floating engagement against said articles and simultaneously engage a plurality thereof, a plurality of feelers pivotally mounted on said sled and arranged to engage said articles adjacent the runners, means for resiliently pressing said feelers individually against said articles, an electric circuit, and contact members actuated by relative movement of said feelers as they individually pass from engagement with one to another of said articles to control said circuit.

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