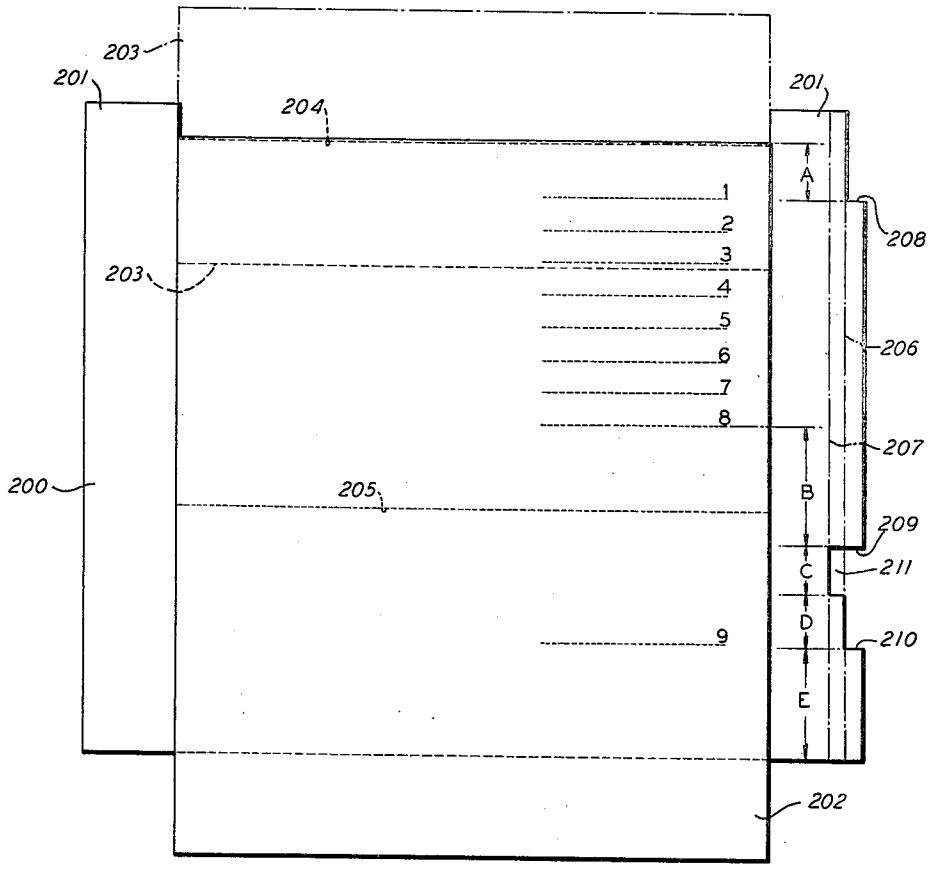
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PAPER FEEDING DEVICE

Filed Nov. 5, 1938 5 Sheets-Sheet 1

Fig. 1.



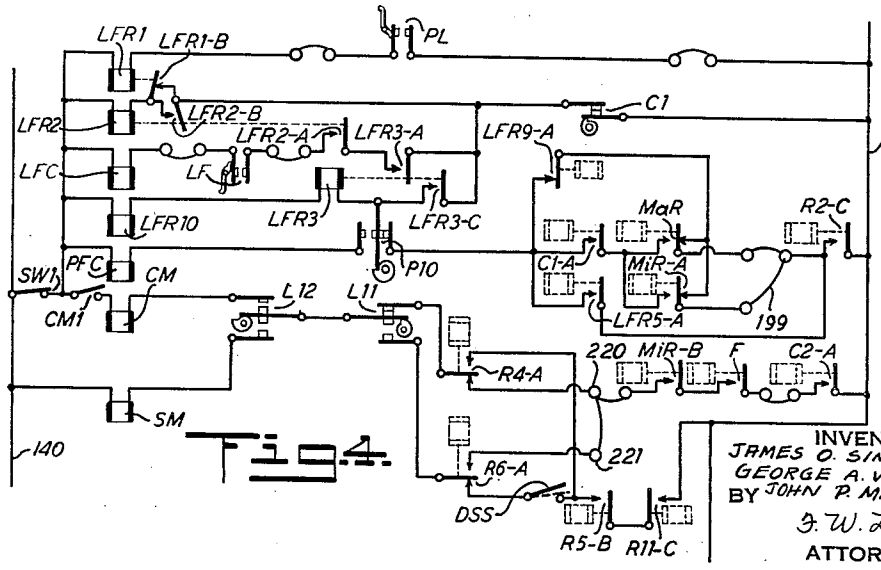


Fig. 4.

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Fig. 2.

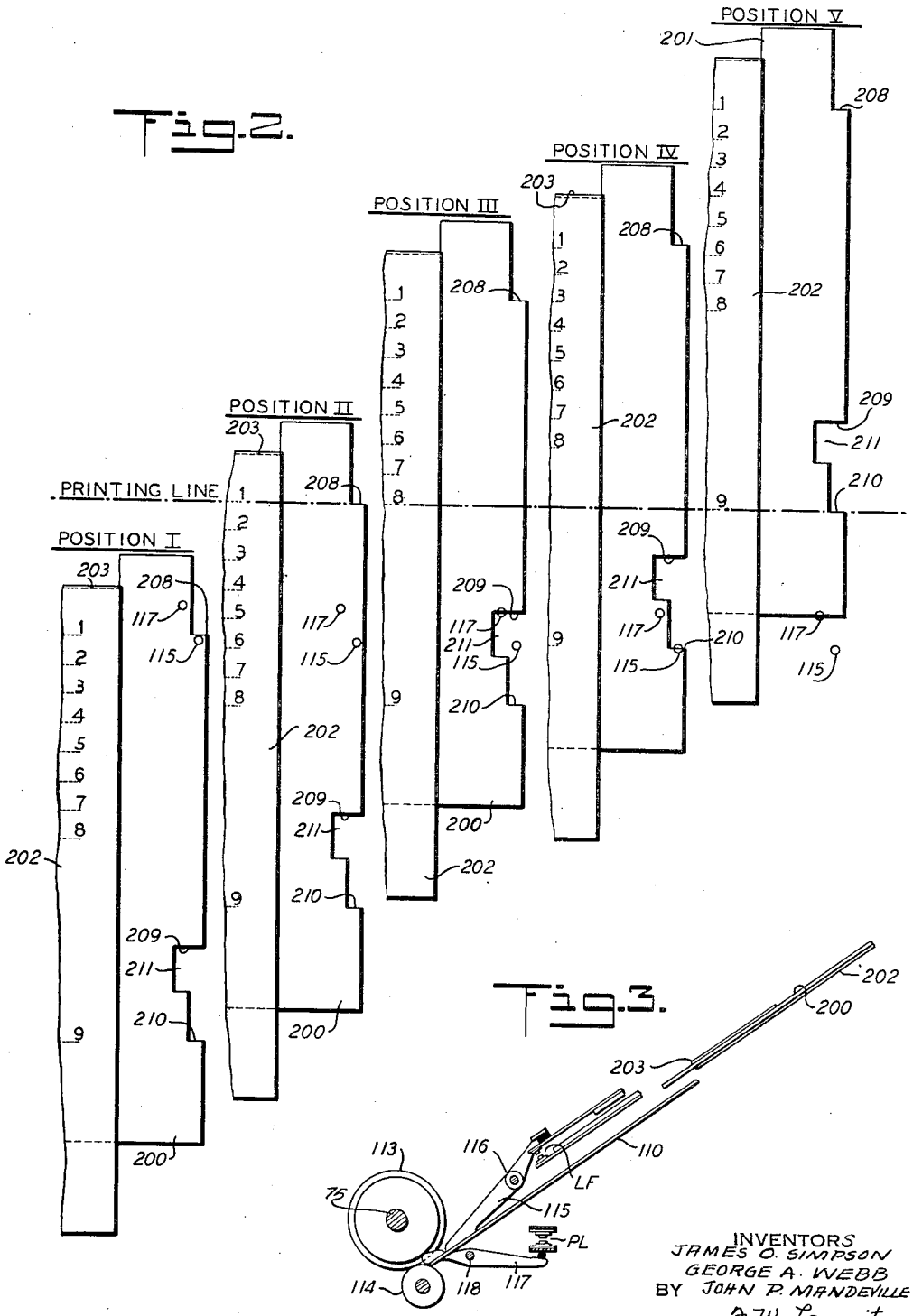


Fig. 3.

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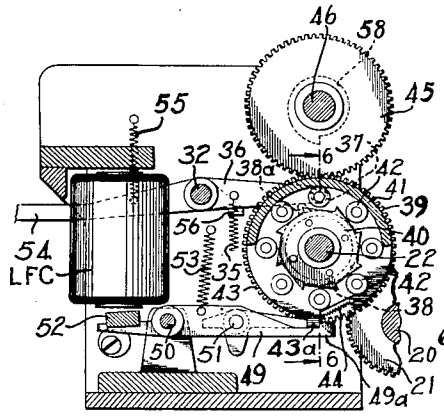


FIG. 8.

FIG. 5.

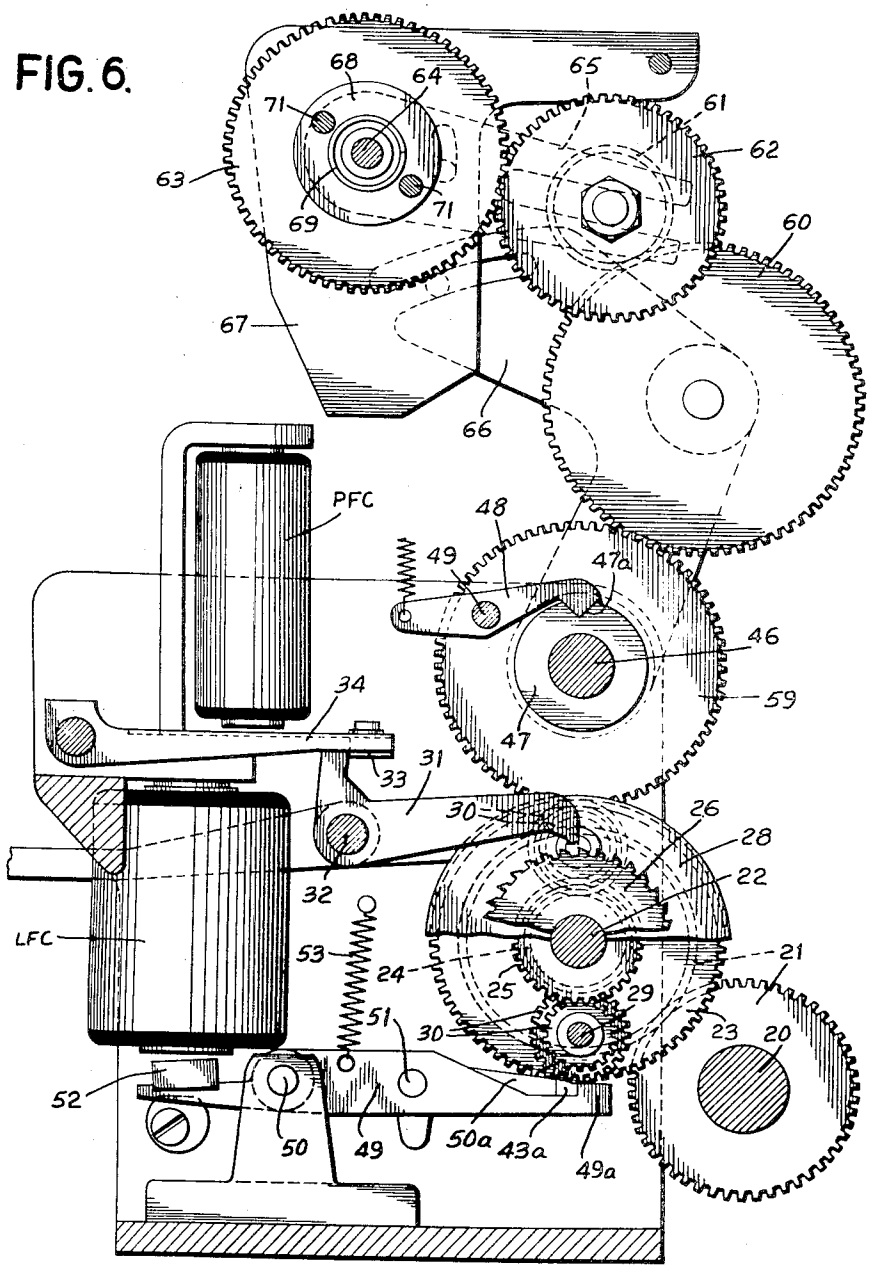
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FIG. 6.



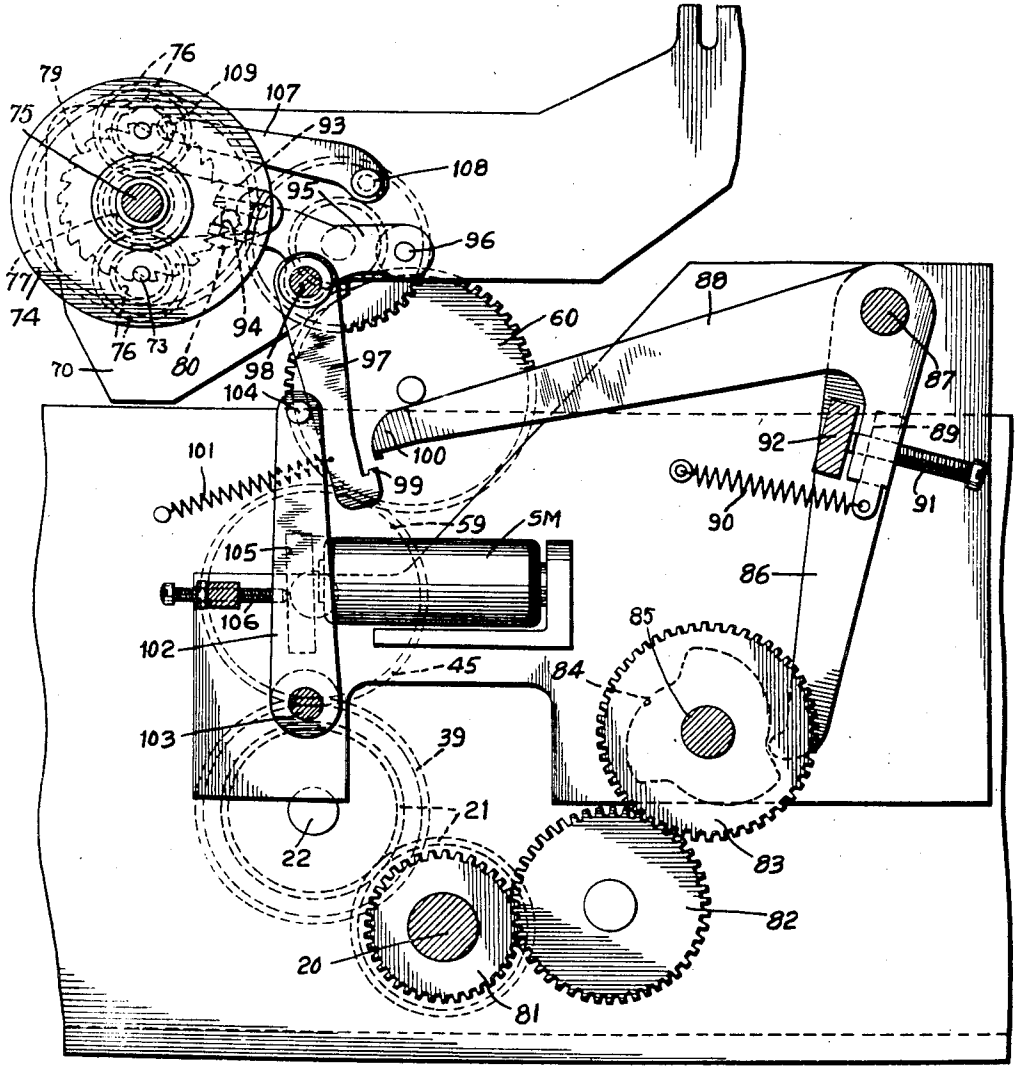
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FIG. 7.



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UNITED STATES PATENT OFFICE

2,213,571

PAPER FEEDING DEVICE

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Application November 5, 1938, Serial No. 239,016
In Great Britain July 8, 1938

11 Claims. (Cl. 197—127)

This invention relates to backings for sheets for use in printing machines. When inserting thin paper sheets in printing machines, difficulty is found in registering the flimsy sheet relative to the printing elements of the machine, even when a guide for one of the margins of the sheet is provided. It is one object of this invention to provide a strong backing member for such a sheet which facilitates the insertion of the sheet into the printing machine.

More specifically, it is an object of the invention to provide for use with a thin paper sheet in a printing machine, a backing member or card having two ears projecting from one of its margins and spaced apart by a distance equal to the width of the sheet with which it is to be used. The thin paper sheet is folded at one end over the said margin of the card between the ears so as to be registered longitudinally of the backing card and engages both ears with its opposite margins at the ends of the fold so as to be registered laterally on the backing. It will be seen that the sheet is definitely registered on the backing card both longitudinally and laterally, so that correct insertion of the sheet is assured if the backing is correctly inserted. The backing member, although it is flexible, can be made sufficiently stiff so that it may be readily inserted with the aid of a guide such as is usually provided in printing machines.

Another feature of the invention is concerned with backing cards for sheets for use in printing machines of the kind comprising long-feed mechanism operable to feed a sheet to an indefinite extent, means for bringing said mechanism into action and a detecting member cooperating with a perforation or a cut-away portion in the card to interrupt operation of the long-feed mechanism when it detects the perforation or an edge of the cut-away portion.

It is frequently undesirable to mutilate the sheets by perforating them or cutting away portions, and to avoid such mutilation the present invention provides a backing card having means for registering a sheet relatively to itself and a perforated or cut-away portion for actuating the detecting member of the machine.

In the U. S. application, Serial No. 202,220, filed April 15, 1938, based on British patent specification No. 11912/37, there is described a machine in which the detecting member traverses a marginal strip of the sheet, the leading edge of which is partially removed to form a step. The member does not exercise control until the step reaches it and is then operative to interrupt operation of the long-feed mechanism. If the long-feed mechanism is called into action before the trailing margin of the sheet has passed the member, the member would be operative to interrupt operation by the long-feed mechanism unless provision is made to prevent this. This provision comprises a second detecting member which traverses an unmutilated strip of the sheet and which is operative, so long as it detects the sheet, to prevent the first member interrupting operation by the long-feed mechanism, but which is operative as soon as it detects absence of the sheet to permit the first member to interrupt operation by the long-feed mechanism.

With this arrangement the long-feed mechanism is brought into action when printing has been completed on one sheet and operates until the next sheet is inserted and has been fed forward sufficiently to bring the step under the first detecting member, when the latter operates to interrupt operation by the long-feed mechanism in such a way that the first line of the sheet is at the printing line of the machine.

It is frequently desirable to print a number of lines and then to space the sheet a number of lines and print a further line or lines. The spacing of the sheet can conveniently be effected by bringing the long-feed mechanism into action when the last line of the first group is printed and interrupting feed operation when the first line of the next group is in the printing position.

In order to bring about such intermediate spacing operation, the present invention provides a backing card having means for registering a print-receiving sheet relatively to itself and two cut-away portions extending across the strip of the backing member traversed by the first detecting member, one at the leading end of the strip and the second at an intermediate point in the said strip and having the second cut, but not the first, extending across the strip of the backing member traversed by the second detecting member. If more than one intermediate spacing operation is required there may be provided more than one intermediate cut-away portion extending across both strips. The second cut provides not only a second step in the first strip to operate the first detecting member, but also a gap in the second strip to cause the second detecting member to be operative to permit the first detecting member to interrupt the long-feed operation when it detects the second step.

Further objects of the instant invention reside in any novel feature of construction or opera-

tion or novel combination of parts present in the embodiment of the invention described and shown in the accompanyinng drawings whether within or without the scope of the appended claims and irrespective of other specific statements as to the scope of the invention contained herein.

In the drawings:

Fig. 1 shows the backing member with a sheet assembled thereon.

Fig. 2 shows the successive positions of the backing member during a printing operation.

Fig. 3 shows a platen by which the backing member and sheet are fed and also shows associated detecting levers.

Fig. 4 is a circuit diagram for the relays controlled by the detecting levers.

Fig. 5 is a front elevation at the left hand end of the platen showing the long feed mechanism and the line spacing mechanism for driving the platen.

Fig. 6 is a section on the line 6—6 of Fig. 5 and shows the long feed mechanism in side elevation.

Fig. 7 is a section on the line 7—7 of Fig. 5 and shows the line spacing mechanism in side elevation.

Fig. 8 is a section on line 8—8 of Fig. 5 and shows devices for ending a long feed operation.

The backing member or card consists of a sheet 200 (Fig. 1) of stiff paper or other suitable material having ears 201 projecting from its upper margin. The distance between these ears is equal to the width of a thin paper sheet 202 that is to be applied to the supporting card 200. The top part 203 of the sheet (shown in dot and dash lines) is folded over against the back of the sheet, and the sheet is applied to the backing card 200 with the part 203 lying behind the card and with the fold engaged against the top margin 204 of the card. It will be seen that the sheet is registered lengthwise on the card by the engagement of the top margin 204 with the creased part of the fold in the sheet, and sideways by the ears 201 engaging the side margins of the sheet.

The illustrated backing card 200 is designed for a sheet on which printing can be effected on nine lines numbered 1 to 9 in Fig. 1, and divided into an upper group of eight lines and a lower single line separated from the group of lines by a space. This arrangement is suitable for preparing a dividend statement and warrant, and this mode of use will be described, the sheet being divided by a perforated line 205 in the usual manner.

The right-hand strip of the card 200 to the right of the dotted line 206 will be referred to as the first strip, and the strip between the dotted lines 206 and 207 as the second strip. The first strip is cut-away from the top down to a step or shoulder 208 level with line 1. It is also cut away from a point 209 down to a shoulder 210 level with line 9. The second strip is cut away below 209 to form a gap 211. The function of these cut-away portions will be apparent from the following explanation of the sheet-feeding mechanism and how it feeds the sheets.

The sheet-feeding mechanism is the same as that described in U. S. application, Serial No. 202,220, and will only be described sufficiently for an understanding of how it controls movement of the card 200 and sheet 202. The card and sheet are placed face downwards (Fig. 3) on a tray 110 with the right-hand margin of the card against a guide (not shown) and are slid down the tray until their leading upper margin enters between a rotating platen 113 and a pressure roller 114. The platen is driven by long-feed mechanism which is brought into action by the previous energization of a magnet PFC (Fig. 4) in a manner described hereinafter. The magnet PFC engages a clutch to connect the platen to a constantly rotating shaft. To disengage this clutch, a magnet LFC (Fig. 4) is energized and engages a second clutch through which a cam is driven for a single revolution only. This cam disengages the first clutch when it has nearly completed its revolution and thus the platen is brought to rest after turning through a predetermined angle from the position it occupied when the magnet LFC was energized.

As the card 200 is moved towards the platen 113 (Fig. 3) it engages and rocks a detecting lever 117 about its pivot 118 to close contacts PL. The lever 117 traverses the second strip on the card between the lines 206 and 207 (Fig. 1). After the leading margin of the sheet and card is between the platen 113 and the roller 114, a lever 115 is engaged by the feed control indice or step 208 on the card and rocked about its pivot 116 to close contacts LF. It is essential that these contacts do not close before the leading margin of the sheet and card have been gripped by the platen and roller and, therefore, the dimension A (Fig. 1) of the card must not be less than the distance between the left-hand end of the lever 115 and the bight between the platen and roller.

Before the sheet and card were inserted, the contacts PL (Fig. 4) were open so that a relay coil LFR1 was de-energized and its contacts LFR1—B were closed. A relay coil LFR2 was thus energized through these contacts and cam contacts C1. The coil LFR2 closes its contacts LFR2—A. Relay coils LFR3 and LFR10 are also energized at this time in a manner explained later. Contacts LFR3—A are thus closed. Thus, when the contacts LF are closed, the magnet LFC is energized through the contacts LF, LFR2—A, LFR3—A and C1. The magnet LFC then clutches up the cam previously referred to and this cam interrupts the operation of the long-feed mechanism when the sheet has reached position II of Fig. 2. The contacts C1 are opened by a cam which is also brought into action by the magnet LFC so that the relays LFR2, LFR3 and LFR10 are de-energized. Previous to this, the contacts PL closed to energize the coil LFR1 which opened its contacts LFR1—B. The coil LFR2 is, however, held energized by the associated holding contacts LFR2—B until the contacts C1 open.

The machine is driven by a tabulating motor, not shown, and includes a shaft 20 (Fig. 5) which is driven continuously. This shaft 20, through gear-wheels 21, drives a drive shaft 22 of the long-feed mechanism. A driving gear-wheel 23 (Figs. 5 and 6) is rotatable on the shaft 22 and can be connected to it by a coupling constituted by an epicyclic gear. This epicyclic gear comprises a sun-wheel 24 which is secured to the drive shaft 22 and a sun-wheel 25 which is rotatable on the shaft 22 and is secured to a ratchet-wheel 26 by a sleeve 27. A disc 28 is rotatable on the sleeve 27 and is secured to the gear-wheel 23 by spindles 29, the assembly comprising the gear-wheel 23, the disc 28, and the spindles 29 constituting a planet carrier. Compound planet-wheels 30 are rotatable on the spindles 29 and mesh with the sun-wheels 24 and 25. A stop pawl 31 (Fig. 6) is secured on a rockable spindle

32 and is normally latched away from the ratchet-wheel 26 by a projection 33 on the armature 34 of a feed coupling magnet PFC. Thus, the ratchet-wheel 26 and the sun-wheel 25 are normally free to rotate and no torque can be transmitted through the epicyclic gearing to the driving wheel 23. When the magnet PFC is energized, it releases the pawl 31 and the stop pawl is moved by a spring 35 (Fig. 8) to engage and arrest the ratchet-wheel 26 and the sun-wheel 25. The driving wheel 23 is then connected to the drive shaft 22 through the sun-wheel 24 and the planet-wheels 30. The spring 35 is connected to an arm 36 (Fig. 8) which is secured on the spindle 32 so that the arm 36 and stop pawl 31 rock together.

The arm 36 carries a roller 37 engaging a cam 38 having a single rise 38a (Fig. 8). The cam 38 is rotatable on the drive shaft 22 and is secured to a gear-wheel 39 which may be coupled to the drive shaft 22 by a clutch of the roller type. This clutch comprises a cam plate 40 (Fig. 8) which is secured to the gear-wheel 39 and a drum 41 which is secured to the shaft 22. As shown in Fig. 8 the cam plate 40 has a series of flats which provide, with the inner surface of the drum 41, a series of tapering spaces. A roller 42 is mounted in each of these spaces and these rollers are rotatably carried by a roller plate 43 which is mounted on the hub of the gear-wheel 39 so that it can rock relatively to the gear-wheel. A spring 44 biases the roller plate 43 to move counter-clockwise (Fig. 8) relatively to the cam plate 40 so as to move the rollers into the narrow portions of the spaces where they wedge the cam plate 40 and the drum 41 together to transmit the drive from the shaft 22 to the gear-wheel 39.

The gear-wheel 39 meshes with a gear-wheel 45 which is secured on a shaft 46. A disc 47 (Fig. 6) is also secured on the shaft 46 and is formed with a notch 47a which is normally engaged by the nose of a spring-biased pawl 48. The pawl 48 is pivoted at 49 on a frame of the machine and serves to hold the shaft 46, and therefore the gear-wheels 45 and 39, in a definite position. Consequently, the cam plate 40 is normally held in the position shown in Fig. 8. The roller plate 43 is provided with a projection 43a (Fig. 8) which normally engages the nose 49a of a lever 49 which is pivoted at 50. The roller plate is thus held by the lever 49 in such a position that the rollers 42 are in the widest part of the spaces between the cam plate 40 and the drum 41. Thus, normally no drive is transmitted through this roller clutch. A spring-pressed dog 50a is pivoted at 51 on the lever 49 and snaps behind the projection 43a so that the roller disc 43 is positively held against movement in both directions. The lever 49 carries an armature 52 of a line-finding clutch magnet LFC. When the magnet LFC is energized, it rocks the lever 49 clockwise so that the nose 49a moves clear of the lug 43a and the roller disc 43 is released. The spring 44 then rocks the roller disc 43 relatively to the cam disc 40 to engage the roller clutch as described above. The cam 38 then turns through one revolution at the end of which the roller disc 43 is again held by the nose 49a engaging the projection 43a, the magnet LFC having been deenergized. A spring 53 biases the lever 49 to rock counter-clockwise. As the cam 38 nears its normal position, the cam rise 38a engages the roller 37 and rocks the lever 36 and the spindle 32. Consequently, the stop pawl 31 (Fig. 6), which is secured on the spindle 32, is rocked counter-clockwise away from the ratchet wheel 26 and is re-latched by the projection 33 on the armature 34. The drive from the drive shaft 22 to the driving gear 23 is thus interrupted.

It will be noted that the energization of the magnet LFC results in the drive to the driving gear 23 being interrupted, but this interruption occurs a short time after the magnet was energized, and during this time the driving gear 23 turns through a constant angle which is nearly one revolution. The reason for this will be explained later.

A key lever 54 is pivoted on the shaft 32 and is held upwardly by a spring 55 against a suitable stop (not shown). The lever 54 has a lug 56 which extends under the arm 36. The long-feeding operation can be stopped at any time by depressing on the end of the lever 54 so as to rock the lever and move the lug 56 upwardly. This rocks the arm 36 and the connected pawl 31 upwardly to interrupt a long-feeding operation in the manner previously described.

The gear-wheel 45 carries a cam 58 which operates a pair of contacts C1 shown in the circuit diagram. The function of these contacts will be explained later, but it will be observed that the cam 58 only rotates while the roller clutch is engaged.

The driving gear-wheel 23 drives a gear-wheel 59 (Figs. 5 and 6), which is rotatable on the shaft 46 and which in turn drives a gear-wheel 60. The gear-wheel 60 drives a gear-wheel 61, which is secured to a gear-wheel 62. The gear-wheel 62 drives a driving gear-wheel 63 which is secured on a driving shaft 64. In order to allow for variation in the gear ratio between the shaft 22 and 64, the gear-wheels 61 and 62 are mounted in a slot in an arm 65 which is pivoted on the shaft 64. The gear-wheels 61 and 62 can thus be removed and replaced by others of different diameter. The gear-wheel 60 is carried by an arm 66 which is pivoted on the shaft 46 so that its center can be adjusted to suit the gear-wheels 61 and 62 employed. In this manner the amount of movement imparted to the shaft 64 between the energization of the magnet LFC (Fig. 8) and the actual interruption of the long-feeding operation can be adjusted. The gear-wheel 63 is prevented from axial movement to the left (Fig. 5) by the hub of the arm 65, which, in turn, is held against movement to the left by a fixed frame 67. A friction disc 68 is pressed against the right-hand face (Fig. 5) of the gear-wheel 63 by a spring 69 which is compressed between the disc 68 and a fixed frame member 70. Two pins 71 are secured to the frame member 70 and fit into holes in the disc 68 so as to hold the disc 68 against rotation. This disc 68 thus acts as a brake on rotation of the gear-wheel 63 so that this gear-wheel and the shaft 64 will be brought rapidly to rest as soon as the drive to them is interrupted. The brake also serves to hold the shaft 64 stationary during line-spacing operations.

A disc 72 is rotatably secured on the right-hand end of the shaft 64 and is connected by two spindles 73 to a second disc 74 which is rotatable on the platen shaft 75. The assembly 72, 73, 74 constitutes the planet carrier of the second epicyclic gear, and compound planet-wheels 76 are rotatable on the spindles 73. The planet-wheels 76 mesh with a sun-wheel 77 secured to the shaft 64 and a sun-wheel 78 secured to the platen shaft 75. The disc 72 is secured to a ratchet-wheel 79

(Fig. 7) which is held against rotation in a counter-clockwise direction by a line-spacing pawl 80. The shaft 64 is always driven clockwise and tends to rotate the shaft 75 clockwise and the planet carrier and the ratchet wheel 79 counter-clockwise. Since the ratchet-wheel 79 cannot turn counter-clockwise, the platen shaft 75 will be rotated clockwise at a relatively high speed. The platen is secured on the shaft and serves to feed the ledger sheet until the first blank line is at printing position and also to eject the ledger sheet.

It will be seen from the foregoing that a long-feed operation can be initiated by energizing the magnet PFC and the platen will continue to turn until the magnet LFC is energized. The platen will turn to a predetermined extent after the magnet LFC has been energized and will then come to rest.

The line-spacing mechanism is shown in Fig. 5 and Fig. 7 and operates as follows:

The shaft 20 carries a gear-wheel 81 which, through an idler wheel 82 drives a gear-wheel 83. A three-lobe cam 84 is secured to the gear-wheel 83 and thus rotates continuously on a stub shaft 85. An arm 86 is pivoted at 87 and is rocked three times in each cycle by the cam 84. A bell-crank lever 88 is secured to the arm 86 by a bridging piece 89 so that the horizontal arm of the lever 88 is moved down and then up three times in each cycle. A spring 90 causes the arm 86 to follow the contour of the cam 84, and the extent to which the assembly 86, 88 rocks clockwise can be adjusted by means of a screw 91 screwed into the bridging piece 89 and engaging a stop 92.

The pawl 80 is pivoted on the end of an arm 93 and is spring-biased towards the ratchet-wheel 79. The arm 93 has a pin 94 engaging a slot in an arm 95 which is pivoted at 96. A link 97 is pivoted to the arm 95 at 98. The link 97 has a hook 99 adapted to be engaged by a hook 100 on the bell-crank lever 88 when the link 97 is moved to the right from the position shown in Fig. 7. A spring 101 normally holds the link 97 in the position shown so that the bell-crank lever 88 can rock idly.

A pair of levers 102 are pivoted at 103 and are connected together by a rod 104 and an armature 105. The link 97 bears against the rod 104 so that the spring 101 normally holds the levers 102 in the position shown, with the armature 105 engaging an adjustable stop 106. When a line-space magnet SM is energized, it attracts its armature 105 and rocks the levers 102 about their pivot 103. The rod 104 moves to the right (Fig. 7) so as to move the link 97 to the right with its hook 99 under the hook 100. At this time the bell-crank 88 is rocking counter-clockwise so that it will depress the link 97 to rock the arm 95 counter-clockwise and the arm 93 clockwise. The pawl 80 will thus feed the ratchet-wheel 79 through a tooth space. The ratchet-wheel 79 is thus turned clockwise and turns the planet carrier 72, 73, 74 clockwise also. The sun-wheel 77 is stationary at this time so that the compound gear-wheels 76 will roll over it and rotate about their own axes. Owing to the fact that the larger wheel in each compound gear meshes with the smaller sun-wheel 77, the extent of movement which is correct for true rolling movement between the larger wheel 76 and the sun-wheel 77 is too great for true rolling movement between the smaller wheel 76 and the sun-wheel 78. The sun-wheel 78 will therefore be turned clockwise to rotate the platen one line-space.

A justifying lever 107 is pivoted at 108 and has a pin 109 which rests in the space between the teeth of the ratchet-wheel 79. The function of this lever is to ensure that the ratchet-wheel comes to rest in one of a number of definite positions. It also serves to prevent backwards movement of the ratchet-wheel 79 during long-feed operations. It will be seen that the arrangement avoids any risk of the platen coming to rest after a long-feed operation with the ratchet-wheel in such a position that the justifying pin rests on top of one of its teeth as might be the case if the ratchet-wheel and the platen were secured together as is the usual practice. Consequently, there is no risk of the platen being turned half a line space or one and a half line spaces in the line-spacing operation that follows a long-feed operation.

The present construction will be described as applied to a record card controlled machine of the kind shown in U. S. patent application, Serial No. 731,459, filed June 20, 1934, and British patent specification No. 422,135, known commercially as the "Hollerith rolling total tabulator." The relay LFR1 prevents record card feeding operations taking place when it is de-energized. The relays LFR3 and LFR10 prevent record and card feeding operations taking place when they are energized. After the contacts C1 open, the relays LFR3 and LFR10 will be de-energized and the relay LFR1 will be energized, the contacts PL then being closed. Printing will then take place on successive lines until the last perforated record card of a group has been read and a group change occurs. A number of totalling cycles then take place.

When preparing a dividend warrant relating both to preferred and common shares, the number of shares and gross preferred dividend will be printed on the first line and the number of shares and gross common dividend on the second line. Each line of printing will be effected under control of a separate record card and the gross dividend will be entered into one accumulator from these cards. The income tax deductions will be entered into a second accumulator from the same cards. A minor group change will then occur, as explained later, and five totalling cycles will be initiated. During the five totalling cycles the machines will perform the following operations.

(1) Print the total gross dividend on line 4.
(2) Print the total income tax deduction on line 6.
(3) Subtract the total income tax from the total gross dividend.
(4) And print the difference, that is the net dividend, on line 8.

It will be noticed that no printing takes place on lines 3, 5 and 7. This is because the machine is adjusted to perform a double spacing operation for each total printed, in the manner described in the prior specification aforesaid.

A third card is provided for each shareholder. The first two cards are punched zero in a particular column while the third card is punched one in the same column. The machine is adjusted in a known manner for minor control on this column. Thus a minor group change occurs between the second and third cards and the five totalling cycles aforesaid are initiated. A minor group change results in a minor control relay being energized. This relay then shifts

its contacts MIR—A (Fig. 4). In the last of the totalling cycles contacts C1—A close. A circuit can then be completed through the relay coils LFR10 and LFR3, cam contacts P10, the contacts C1—A and MIR—A and contacts R2—C which are closed at this time. The relay coils operate to prevent the usual automatic restart of record card feeding. The coil LFR3 also closes its contacts LFR3—C to provide a holding circuit for itself and the coil LFR10. The cam contacts P10 shift to provide a circuit including the magnet PFC and the contacts P10, LFR3—C and C1. The long-feed mechanism then comes into action to feed the sheet from position III of Figure 2.

The mechanism is designed to operate in cases where the last total is printed a considerable distance from the bottom of a sheet, so that the lever 115 will be resting on the sheet and holding the contacts LF closed. Thus, the closure of the contacts LFR3—A during the last totalling cycle would energize the magnet LFC were it not for the contacts LFR2—A. Usually these contacts only close after the lower edge of the sheet has passed the lever 115 and permitted the contacts LF to be opened. This results from the fact that the contacts PL open after the contacts LF, owing to the relative positions of the respective levers 117 and 115. The contacts PL open to de-energize the coil LFR1 whose contacts LFR1—B close to energize the coil LFR—2. This coil then closes the contacts LFR2—A and also holds itself energized through the contacts LFR2—B.

It will be seen that the lever 115 operates, when it detects the sheet, to interrupt a long-feed operation, while the lever 117 operates, so long as it detects the sheet, to prevent a long-feed operation being interrupted. In the present instance a long-feed operation is initiated when the sheet and backing are in position III of Fig. 2 and the lever 115 must operate when it engages the feed control indice or step 210 in the backing card 200 (position IV of Fig. 2) to interrupt the long-feed operation. The feed control notch or gap 211 in the backing card permits the lever 117 to rock when the backing moves from position III to position IV (Fig. 2). The contacts PL thus open and their opening results in the contacts LFR2—A being closed as just explained. When the backing member reaches position IV of Fig. 2, the lever 115 is rocked to close the contacts LF and the long-feed operation is interrupted when the sheet reaches position V of Fig. 2.

The length C of the gap 211 in the backing card 200 must be sufficiently long to permit contacts PL to be closed to energize the relay LFR1. It is found that ¾" is a suitable length for the gap 211. The dimension D should be sufficient to allow the contacts LFR2—A to be closed before the step 210 reaches the lever 115.

The ninth and last line of the sheet is thus brought to the printing line and record card feeding is resumed to feed the third data card relating to the shareholder in question. The machine is operated for major group control on shareholder numbers punched in each card so that a major group change will occur between the third record card relating to one shareholder and the first record card relating to the next shareholder. The machine is adjusted so that two totalling cycles occur on a major group change. In the first of these cycles, the net divided is printed on line 9, while in the second, the two accumulators are reset. The major group change results in a major control relay being energized and this relay shifts its contacts MaR (Fig. 4). During the second of the two totalling cycles, a circuit is completed with the contacts MaR, C1—A and P10 to energize the coils LFR3 and LFR10, and a long-feed operation is initiated in the manner previously described. The sheet 202 and backing 200 are then fed out. Record card feeding is prevented as before, until a new sheet has been inserted and its first line has been brought to the printing line.

The dimension E (Fig. 1) must be greater than the distance between the printing line and the end of the lever 117 in order that the contacts PL may be held closed when the sheet is in position V of Fig. 2. If these contacts open before line 9 of the sheet reaches the printing line, they would de-energize the relay LFR1 which would prevent further data card feeding operations so that the third record card would not be fed and the machine would operate idly. The dimension B should be equal to the dimension E to allow amounts from a record card to be printed on the line 8 of the sheet.

It is desirable to suppress the usual spacing operation when printing the total on line 9. Line spacing is effected by a magnet SM by circuits which include plug wiring sockets 220 and 221. These sockets can be plugged to a pair of contacts which close in the particular totalling cycle in which printing is required. Contacts C2—A close in the penultimate cycle of each group of totalling cycles and these contacts are plugged to the sockets 220 and 221 through contacts MiR—B which close on a minor group change, but not on a major group change. Thus the sheet will spaced in the last but one of the five cycles resulting from a minor group change, but not on the first of the two cycles resulting from a major group change.

A switch CM1 is opened to render a cutting magnet CM inoperative. This magnet normally operates means for cutting a piece out of the record sheet for each printing operation so that a step in the sheet (corresponding to the step 208 in Fig. 1) moves down the sheet as the lines are filled. This mechanism is put out of action because it is not required to lower the step 208 of the backing member as successive lines are printed. Certain contacts shown in Fig. 4 have not been referred to herein since the functions of these contacts are not of major concern herein, and they are fully described in the prior specification aforesaid.

The backing member 200 shown in Fig. 1 may be made without the cut-away portions in its right-hand margin and then be used merely for facilitating the insertion of flimsy sheets into any kind of printing or sheet handling mechanism. The backing member is made of sufficient stiffness so that it may be easily inserted into the machine in proper alignment with the printing elements of the machine and, since the paper sheet will be accurately registered on the backing, it will also be in proper alignment with the printing elements of the machine. If the machine is provided with a marginal guide, it is of no practical use in aligning the flimsy sheet with respect to the printing elements of the machine, since the sheet alone has not sufficient stiffness. When, however, the sheet is mounted on the backing member shown in Fig. 1, one margin of the backing can be brought against the guide which

can thus be used to align both the backing and the sheet with respect to the printing elements of the machine.

It may be noted that folded over portion 203 of the record sheet 202 can be of any differential length, and when creased at the proper point bring any line on the sheet to coincide with the initial printing position on the backing member. Such different placement of a sheet on the backing is useful in ledger posting work where the ledger sheet is reinserted differentially to receive initial printing impressions directly under previously recorded impressions.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A holder for paper sheets comprising a planar, imperforate and stiff backing card having two ears projecting from one of its margins, and adapted to carry one of said paper sheets folded at one end over said margin of the card between the ears so as to be registered longitudinally on the card and engaging both ears with the opposite margins of the sheet so as to be registered laterally on the card, said card also having feed control extensions extending from one of the margins.

2. In a machine with devices for printing on record sheets, backing cards adapted to carry said sheets, each card having feed control projections and other projections for confining a sheet thereon, means under control of said feed control projections for automatically inserting and feeding said card to position the card and sheet to receive print at certain preselected points thereon, said sheet being folded at one end over the backing card to assume a print receiving position thereon, the size of said fold determining the line of the sheet on which printing is started.

3. In a machine with devices for feeding and printing items of data on reinserted ledger sheets, backing members adapted to carry said sheets, each member having means for holding a sheet thereon, and other means for controlling the feeding thereof, means for automatically inserting and feeding said member, means under control of the feeding control means of the member for controlling the operation of the automatic inserting means so that said member and assembled sheet are fed a predetermined extent and placed in position to start or resume printing of items, said sheet being folded over one end of the member to assume a print receiving position relative thereto, the length of said fold being determined by the number of items already printed on said sheet and so proportioned that printing is resumed directly under previously printed items or on the first line.

4. In a machine for printing on record sheets, a flat backing card formed with a recess adapted to carry one of said record sheets, said card being provided with feed control indicia, and means for controlling the positioning of said card and record sheet under control of said indicia of the card.

5. In a machine with devices for printing and feeding ledger record sheets, a backing card adapted to carry an unmutilated record sheet, said card being provided with feed control indicia, means for detecting said indicia and means under control of said detecting means for controlling operation of said feeding devices to position said card and sheet so that the printing is received at various positions thereon.

6. In a machine with devices for printing and feeding ledger record sheets, a backing card adapted to carry a record sheet, said card being provided with a plurality of sets of feed control indicia, a plurality of sensing devices for detecting the passage of said indicia as said card is moved by the feeding devices, and means under control of said sensing devices for controlling starting and stopping operation of said feeding devices to position said card and sheet so that the printing impressions are spaced in a predetermined arrangement on said sheet.

7. In a machine for printing on record sheets, each sheet made up of a pair of connected forms, devices for controlling a long feeding operation to insert a sheet and feed it from form to form, a backing member adapted to carry a sheet, said member being provided with feed control indicia, means for sensing said indicia, and means under control of said sensing means for stopping said long feeding operation to position said member and associated sheet to receive printing at desired lines on both forms.

8. In a machine for printing on ledger record sheets, a backing card adapted to carry a sheet, said card being formed with feed control notches, means for feeding said card and sheet, a lever resting on said card in the path of said notches, and means under control of said lever for controlling said feeding means to position said card and sheet so that the printing of impressions are received on the sheet in a predetermined arrangement.

9. In a machine for printing on ledger record sheets, including line space devices and long feed mechanism operable to feed a sheet further than a line space, a backing member adapted to carry a sheet, said member being cut with a feed control notch, a detecting member cooperating with said member to sense said notch, means for initiating operation of said long feed mechanism, and means under control of said detecting member for stopping operation of said long feed mchanism so that said sheet is positioned to receive printing impressions.

10. In a machine with devices for printing and feeding ledger record sheets, a backing card adapted to carry a sheet, said card being formed with two feed control notches, one at the leading end to control the positioning of the sheet in an initial position and the other at an intermediate point on said card to control the positioning of the sheet at an intermediate position, means for sensing said notches, and means under control of said sensing means for controlling the operation of the feeding devices to hold the card and sheet in predetermined print receiving positions.

11. In a machine for printing items on record sheets including line spacing and long feeding mechanism, a backing member adapted to carry a sheet, said member having a feed control notch at the leading end and a second deeper feed control notch at an intermediate point, a sensing lever resting on said member in the path of both notches, a second sensing lever resting on said member in the path of the deeper part of the sec-

ond notch, means under control of said first mentioned lever for interrupting operation of the long feeding mechanism when the leading notch is sensed to place the sheet in an initial print receiving position, means for initiating operation of the long feed after item printing, and means under control of both sensing levers for interrupting operation of the long feeding mechanism when the second notch is sensed to place the sheet in an intermediate print receiving position.

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