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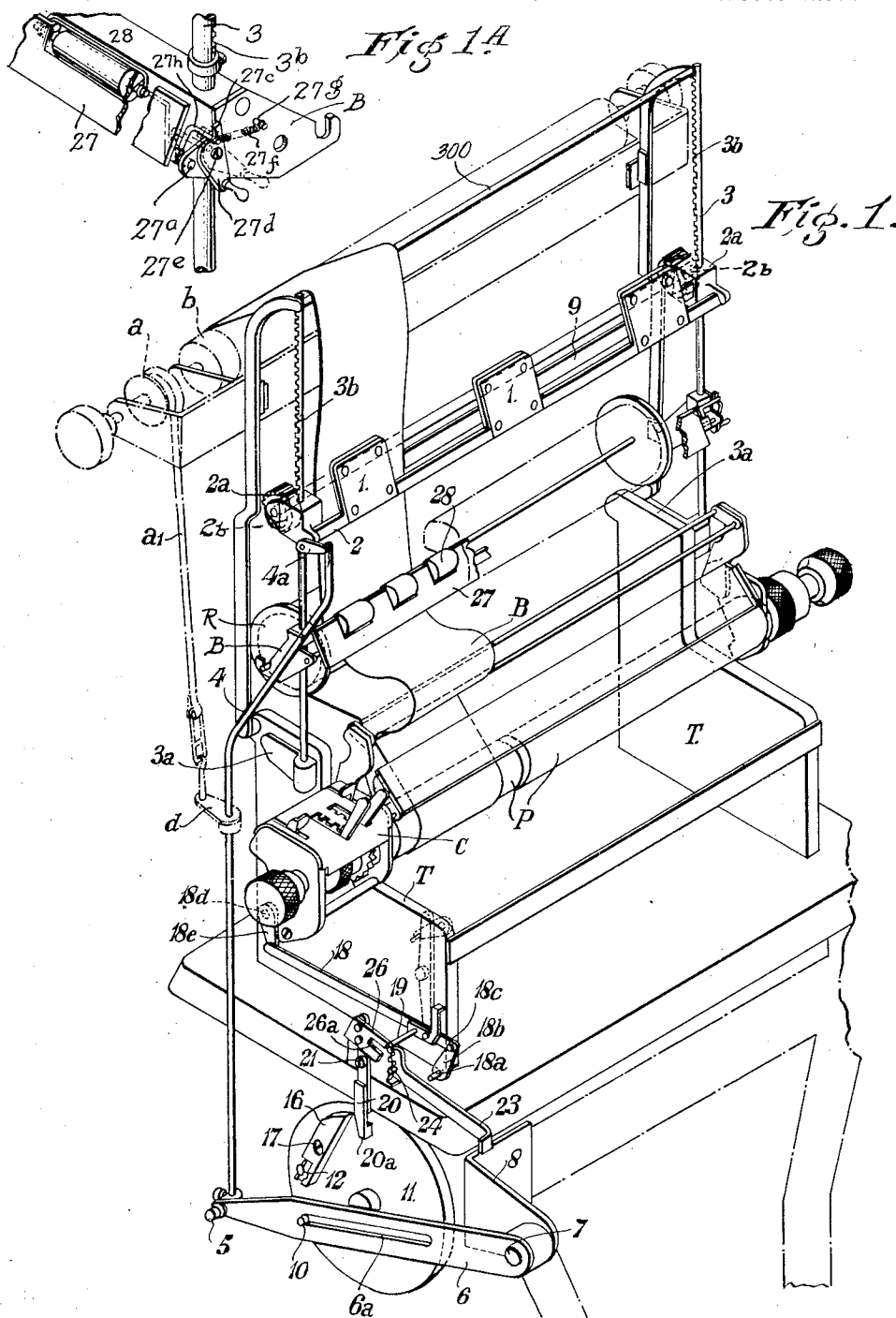
A. THOMAS ET AL

1,896,983

PAPER FEED MECHANISM FOR TABULATING OR OTHER PRINTING MACHINES

Filed Jan. 10, 1930

4 Sheets-Sheet 1



Inventors
ARTHUR THOMAS & F. G. S. ENGLISH.
per: Sydney E. Page.
Attorney

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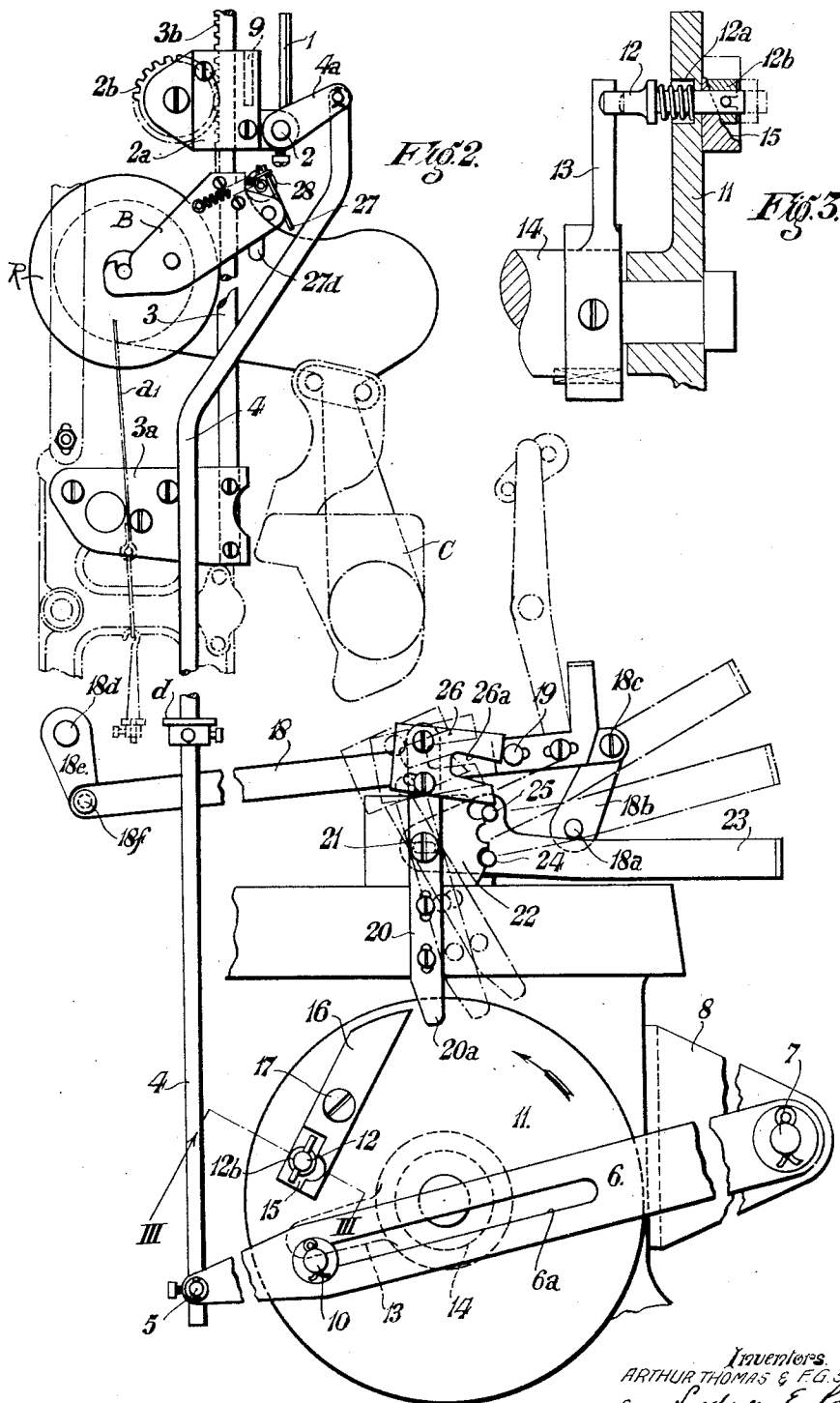
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Inventors.
ARTHUR THOMAS & F. G. S. ENGLISH.
Per: *Lydney E. Page*
Attorney

Feb. 7, 1933.

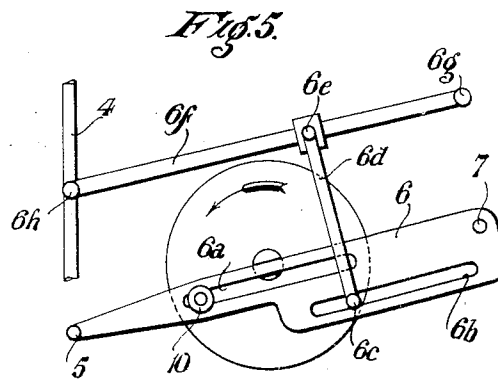
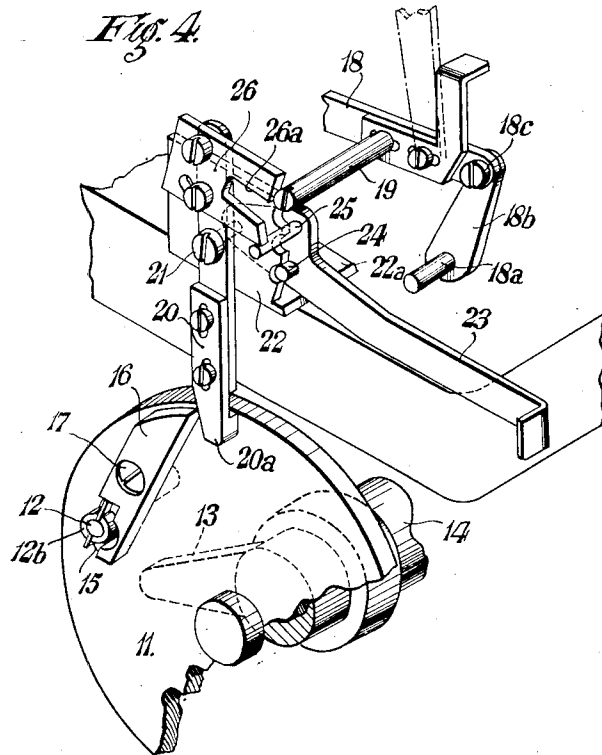
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Inventors
ARTHUR THOMAS & F.G.S. ENGLISH.

Per: Sydney E. Page.
Attorney.

Feb. 7, 1933.

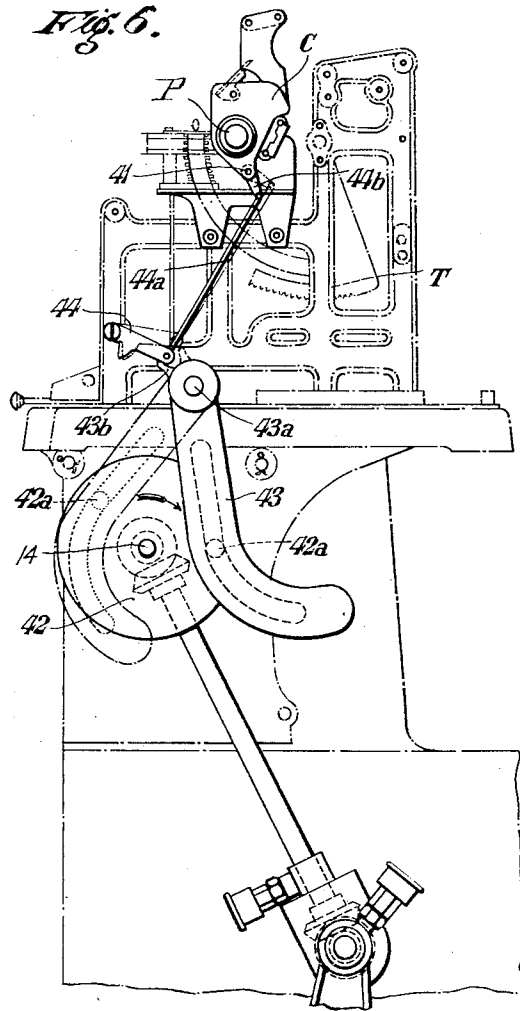
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4 Sheets-Sheet 4



Inventors:
ARTHUR THOMAS & F.G.S. ENGLISH.
Per: Sydney E. Page.
Attorney.

UNITED STATES PATENT OFFICE

ARTHUR THOMAS, OF THORNTON HEATH, AND FRANCIS GUY SYDENHAM ENGLISH, OF WEST CROYDON, ENGLAND, ASSIGNORS TO THE ACCOUNTING & TABULATING CORPORATION OF GT. BRITAIN LIMITED, OF LONDON, ENGLAND

PAPER FEED MECHANISM FOR TABULATING OR OTHER PRINTING MACHINES

Application filed January 10, 1930, Serial No. 419,977, and in Great Britain January 21, 1929.

This invention relates to paper feed mechanism for tabulating or the like printing machines.

In tabulating machines the platen is rotated one step after each printing operation.

A tabulator differs from a typewriter in that in the case of a typewriter the carriage after each impression moves longitudinally and the platen is only stepped round in a rotary motion after each line.

In both such forms of printing machines the platen is provided with a ratchet wheel which is actuated by a feed pawl mounted so as to give an adjustable feed.

The tooth spacing on the ratchet wheel is usually equivalent to the spacing of one line, and the feed pawl is adjustable so as to give a spacing of one to three lines at least. In the tabulator it is usual to permit a rotation of the platen equal to the spacing of four lines.

In a tabulator the feed pawl is operated automatically after each printing operation but in a typewriter this is effected by hand.

The main object of the present invention is to provide an improved means of feeding paper from a roll or reel to tabulating or like printing machines of the kinds hereinbefore referred to so that the paper is divided up into definite standard lengths irrespective of the number of line spacing operations effected in each length, that is to say, in printing successively a series of statements the means provided according to the invention assure that the commencement of each statement is at an equal distance on the sheet from the commencement of the previous statement and of the statement following though the number of items in each vary.

In order that the invention may be more clearly understood reference will now be made to the accompanying drawings which show paper feed apparatus according to the invention applied to an accounting and tabulating machine of the kind described in British Patent specification No. 26896/13, U. S. Patent specification No. 1,245,502.

In the drawings

Figure 1 is a pictorial view showing such a tabulating machine with paper feeding

mechanism according to the present invention.

Figure 1a is a pictorial view to an enlarged scale of the spring pressed rollers for the bight of paper between the gripper and the platen.

Figure 2 is a side elevation to an enlarged scale showing the operating control means of the paper feed mechanism.

Figure 3 is a section on the line III—III of Figure 2.

Figure 4 is an enlarged pictorial view more clearly showing the regulating and cut out means for the paper feed mechanism.

Figure 5 shows a modified form of paper feed mechanism.

Figure 6 is a side elevation of the tabulator showing the mechanism for actuating the line spacing mechanism.

In the drawings like reference numerals designate same or similar parts.

The accounting and tabulating machine generally indicated by the reference T comprising a platen P mounted in a carriage C carried in the machine frame and line spacing mechanism enforcing a step-by-step rotation of the platen after each printing operation. The pawl and ratchet gear (not shown) of the line spacing mechanism, is actuated from a cam disc 42 driven from shaft 14 carrying a pin 42a moving in the slot of a link 43 (Fig. 6) pivoted at 43a in the machine frame and carrying a projection 43b which bears against a spring influenced lever 44 pivoted on the machine frame and connected by rod 44a to an arm 44b secured to a shaft 41 carried by the carriage C which shaft carries an arm (not shown) which moves the pawl to actuate the platen ratchet a line space. Such an arrangement is well known and forms no part of the present invention.

The paper on which the tabulator prints is in the form of a roll indicated at B mounted in a bracket R carried on the machine frame, the paper passing between rails on the carriage C, under and around the platen P, back again between the rails and thence over the back of the machine. In accordance with the present invention the paper before pass-

ing over to the back of the machine is taken up between the integers of a gripping device hereafter described by which the paper is fed at predetermined intervals over the platen by the grippers pulling the paper which has passed the platen.

The paper feeding means which so pulls the paper over the platen according to this invention includes gripping fingers 1 conveniently carried on a rocking bar 2, carried by blocks 2a, slidably supported on posts 3, carried by the head of the tabulating machine T above the carriage C thereof, the rocking bar 2 being connected to one end of a lever 6 connected by a short arm 4a hinged to a rod 4 in turn connected by hinge pins 5 to lever 6, the other end of which lever is carried on a fixed pivot 7, as for example mounted on a bracket 8 carried by the frame of the machine. This lever is rocked in any suitable manner to cause the fingers to grip the paper by enforcing a longitudinal displacement of the connecting rod 4 and the consequential rocking of the bar 2 carrying the grippers 1, which then moves on to a guide bar 9 (see Figure 2) carried by the blocks 2a on the posts 3 aforesaid, so that paper therebetween is gripped between the bar 9 and the grippers, the lever then enforcing a lateral displacement, upwardly of the bar 9 and the gripper 1 with the paper, for the predetermined interval of length of the paper.

At the end (top) of the stroke the gripper 1 is retracted from the bar 9, that is free from the paper, and then, the bar and the grippers are retracted (downwardly) to initial position ready for the next long feed stroke (upward).

In one form of the invention the lever 6 is slotted as indicated at 6a and passes over a pin 10 carried on a disc 11 so that on rotation of the disc the lever 6 is oscillated about its fixed pivot 7.

The disc is provided at the back with a clutch device by which the disc can be connected at will to a continuously rotating shaft 14 by which it can be rotated. To this end the disc may be provided with a plunger 12 pressed by a spring 12a into the path of an actuating arm 13 fixed to the shaft 14 on which the disc 11 is loosely mounted so that the disc is rotated from the shaft by the agency of the constantly rotated arm 13 thereon engaging the spring pressed plunger 12 carried by the disc when the plunger is standing in the path of the arm.

On rotation of the disc 11 the lever 6 is rocked, the paper gripped by the fingers 1 and displaced an amount corresponding to the throw of the pin 10, the fingers being then retracted from the paper and returned to initial position shown in Fig. 1.

To this end the plunger 12 may be provided with a lug 12b under which engages an inclined plane 15 carried on a trip 16 pivoted

at 17 on the face of the disc 11, the trip being disposed so as to be operated from the total taking shaft of the machine.

In printing invoices it is desirable to send the grippers on an excursion at the end of an invoice. In a tabulating machine the end of an invoice is accompanied by a total taking operation in which the items printed in the invoice are added in the machine and the total printed. Accordingly the arm 6 must be actuated after each total taking operation.

The total taking mechanism of an accounting and tabulating machine as illustrated in the drawings is actuated from a rocking shaft, usually termed a total taking shaft, by hand or automatically as described in U. S. patent specifications No. 1,236,481 and No. 1,245,506 or No. 1,376,555 respectively. In the drawings hereto the total taking shaft is indicated at 18a. This shaft 18a is provided with an arm 18b pivotally connected at 18c to a link 18, the other end of this link 18 being pivotally connected by a hinge pin 18f to an arm 18e, which arm is fixed to a shaft 18d carried in the machine frame and on which latter shaft is mounted means to free the printing elements of the machine to print a total as described in U. S. patent specification No. 1,236,481.

The link 18 at the side of the machine is provided with an arm 19, see Fig. 4, which, when the link is moved engages an abutment member in the form of a lever 20, loosely pivoted at 21 in a bracket 22 carried on the machine frame, the end of which is provided with a nose 20a standing in the path of the trip 16, thereby as the trip passes the nose 20a the trip is rocked, and by the agency of the inclined plane wedges the spring pressed plunger 12 back into disengaging power position, and holds it there until the arm 13 has passed the plunger 12.

On the engagement of the arm 19 on the side total link with the lever 20 the nose of the latter is moved out of the path of the trip 16, consequently the spring pressed plunger stands in the path of the rotating arm 13 carried by the shaft 14, thereby the disc 11 is rotated and the gripper 1 operated from the disc as hereinbefore described.

A great many invoices and like documents contain but one item only the amount of which necessarily also is the total. Accordingly, it may be required to leave the trip 16 in disengaging position as regards the plunger 12 so that at every rotation of the shaft 14 the disc and the gripper are actuated. To this end, the lever 20 is preferably provided with a cut out latch hereafter referred to, whereby the control of the gripper can be varied. In such an arrangement the rotation of the disc 11 is synchronous with the platen P so that the gripper 1 moves the sheet through the carriage at predetermined intervals after

each item has been printed. There is thus a clear differential movement, the carriage moves one line space after printing, but the paper goes on moving to the full extent impelled by the gripper, for an ordinary statement say $8\frac{1}{2}$ inches.

To this end the bracket 22 is notched, having three notches, and on the bracket is freely pivoted an operating lever 23 formed with a tooth 24 to engage in one or other of the notches on the quadrant 22. On the operating lever 23 is also formed a lug 25 which, when the tooth 24 is on the top of the quadrant, holds a head 26 on the lever 20 from falling, hence the lug 25 maintains the lever 20 out of engagement with the trip 16, so that the disc 11 is rotated with the shaft 14 and the long feed continuously actuated.

In the middle notch position of the operating lever the lug 25 carried thereby disposes the head 26 of the lever 20 so that the latter is disposed to engage the trip 16 each time the actuating arm 13 on the shaft 14 is approaching the spring pressed plunger 12, thereby the plunger 12 is retracted and the disc is not operated, hence the gripper mechanism is cut out of operation altogether.

In order that this setting shall not be interfered with by the movement of the arm 19 when a total taking operation is being effected, the head 26 is preferably slotted as indicated at 26a so that in this position the arm 19 of the link 18 merely moves freely in and out of the head at each totalling operation, accordingly then the arm 19 hits or misses the head 26 according to the setting of the latter.

In the lowermost position of the operating lever the head 26 of the lever 20 is disposed in the path of the arm 19 of the link 18 so that at each total stroke of the machine the lever 20 is tilted out of the path of the trip 16 so that the plunger 12 is left in the path of the actuating arm 13 and the gripper is actuated on every revolution of the shaft 14.

From the foregoing it will be seen that the disc 11 which moves the lever 6 to operate the connecting rod 4 of the gripper 1 operates the gripper, once for each revolution of the shaft 14 on which the disc is mounted, unless the lever 20 engages the trip 16, the operation each time being first rocking the bar 2 carrying the gripper 1 to hold the paper against the guide bar 9, then the feed (upward) movement of the gripper on the bar 9 with the paper therebetween followed by the release of the paper by the retraction of the gripper 1 from the bar 9, and then the retraction of the gripper with the bar along the paper.

The operating lever 23 aforesaid adjacent a quadrant 22 conveniently comprised in a bracket 22a carried on the frame of the machine is used only for a regulating operation to the extent of varying the intervals of op-

eration of the gripper 1 from the limits of non-operation to working at every printing operation. In the construction described, the operating lever 23 in its highest position on the quadrant 22 prevents the trip 16 from being operated so that the disc 11 is rotated synchronously with the shaft 14. In the middle position the lever 20 is brought into position to engage the trip 16 so that the gripper 1 is never operated and in this position the arm 19 on the link 18 rides freely in and out of the slot 26a of the head 26 of the lever 20 at each totalling operation, and in the lowermost position the head 26 of the lever 20 is permitted to stand in the path of the arm 19 on the link 18 so that only when the total stroke is effected is the gripper 1 permitted to operate.

The blocks 2a carrying the gripper 1 are preferably provided with pinions 2b which ride on teeth of rack formation indicated at 3b, provided on the posts 3, thereby lateral movement of the bar 9 and the gripper is easily attained in a simple and effective manner.

To assure that the paper adjacent the gripper 1 shall take up a position in line with the movement of the gripper, there is disposed above the carriage a guide 27 (see Fig. 1) provided with spring controlled rollers 28 which maintain the paper taut from this guide to the gripper 1. The bight in the paper formed as the tabulator works occurs between this guide 27 and the carriage C. The guide 27 is conveniently mounted in trunnions 27a supported in a bracket B carrying the roll of paper R fixed to the machine frame (Fig. 1a) and carries a projection 27b adapted to engage with a lug 27c, formed in a lever 27d, pivoted at 27e in the bracket B. A spring 27f secured at one end to the projection 27b and anchored at the other end to 27g, normally maintains the guide 27 and the lever 27d in the full line or operative position. When it is desired to release the paper from the rollers 28, the lever 27d is turned into the chain line position. With the lever 27d in this position the platen will feed the paper forward step by step and no bight will be formed.

Although spring pressed rollers have been referred to as a means for forming a bight in the paper, any other means may be provided, for instance, the paper may be caused to pass through a tortuous path involving a plurality of rollers.

The paper passed from the grippers may be taken over a rail 300 which connects the top of the posts 3 and on to a re-winding roller indicated at b which may conveniently be actuated from a spring controlled ratchet wheel a actuated by a pin a1 passing over the roll and connected to the arm 4 which actuates the gripping device by a short arm d indi-

cated in Fig. 1, but this construction forms no part of the present invention.

In constructions according to the present invention a roll of paper is printed giving a succession of forms such as statements on which a varying number of varying items is printed. The items are printed with ordinary line spacing but after the total stroke the paper is fed by the grippers to the head of the next form; the distance it is fed being the difference between the number of lines occupied by the printed items and the length of the stroke of the grippers.

The paper feeding mechanism as herein described affords a method of feeding sheets of printing and like machines in successive columns formed of definite lengths irrespective of the items in each column, and an especial advantage for the mechanism is the printing of statements or invoices of which the first items are equally spaced from one another, always therefore leaving a space between the last item of a column and the first item of the next, wherein a heading may be printed.

The normal feed step by step mechanism for the platen P may be constituted by pawl and ratchet mechanism not shown, the pawls of which are actuated through bell cranks, not shown, from a shaft 41 which is rocked, from a rotating disc 42, carrying an eccentrically disposed pin 42a engaging in a slotted link 43 pivoted at one end 43a, Fig. 11, to the frame T.

The pivoted end 43a of this link carries a projection 43b which bears against a pivoted lever 44 connected through a rod 44a to a short arm 44b, secured to the shaft 41.

The lever is caused to follow the movement of the projection 43b by means of a spring not shown so that as the link 43 rocks, the shaft 41 is also rocked and the pawls actuated to rotate the platen.

What we claim is:

1. A printing machine including a platen provided with line spacing mechanism; comprising in combination with a bar disposed parallelly with the machine platen and guides for the bar arranged in a plane transverse to said platen and at right angles thereto, of bearings on said bar, a finger member hinged on said bearings and means for reciprocating said bar along said guides connected eccentrically to said finger member whereby in one direction of movement the finger member is first rocked to said bar to grip paper therebetween and then the bar forced along said guide with the grip maintained, and in the other direction of movement the finger member is first retracted from said bar and then returned to initial position with said bar.

2. In a tabulating or like printing machine adapted to print accounts on the passage of a statistical card and having total taking

mechanism including a total taking shaft, the combination with the total taking shaft of a disc freely mounted on a continuously driven shaft of the machine, a clutch between said driven shaft and the disc, settable disengaging means for said clutch including a settable connection between the total taking shaft and said disengaging means, whereby the clutch may be engaged from said total taking shaft or continuously disengaged or engaged, a bar disposed parallelly with the machine platen, guides for the bar arranged in a plane transverse to said platen and at right angles thereto, bearings on said bar, a finger member hinged in said bearings, and means transmitting a reciprocating motion to said bar from said disc eccentrically connected to said finger member, whereby the finger member is pushed in a direction away from said platen a predetermined amount and returned to initial position on each revolution of the disc.

3. In a tabulating or like printing machine adapted to print accounts on the passage of a statistical card and having total taking mechanism including a total taking shaft, the combination with the total taking shaft of a disc freely mounted on a continuously driven shaft of the machine, an arm on said driven shaft, a spring pressed plunger carried on the disc and disposed in the path of the arm, a trip member pivoted on said disc, a settable abutment normally adapted to rock the trip on the rotation of the disc and retract the plunger from the path of the arm, an operative connection between said abutment and the total taking shaft, whereby the abutment may be set out of the path of the trip on a total taking operation, a bar disposed parallelly with the machine platen, guides for the bar arranged in a plane transverse to said platen and at right angles thereto, bearings on said bar, a finger member hinged in said bearings, and means transmitting a reciprocating motion to said bar from said disc eccentrically connected to said finger member, whereby the finger member is pushed in a direction away from said platen a predetermined amount and returned to initial position on each revolution of the disc.

4. In a tabulating or like printing machine adapted to print accounts on the passage of a statistical card and having total taking mechanism including a total taking shaft, the combination with the total taking shaft of a disc freely mounted on a continuously driven shaft of the machine, an arm on said driven shaft, a spring pressed plunger carried on the disc and disposed in the path of the arm, a trip member pivoted on said disc, a settable abutment normally adapted to rock the trip on the rotation of the disc and retract the plunger from the path of the arm, a slotted head on said abutment, an arm on the

total taking shaft, a link mounted for reciprocation connected to said arm, a projection on said link disposed to move in and out of the slotted head when the link is reciprocated, means for holding the settable abutment with its head in the path of said projection or with its slot co-incident therewith whereby the abutment may be actuated or not on a total taking operation, a bar disposed parallelly with the machine platen, guides for the bar arranged in a plane transverse to said platen and at right angles thereto, bearings on said bar, a finger member hinged in said bearings, and means transmitting a reciprocating motion to said bar from said disc eccentrically connected to said finger member whereby the finger member is pushed in a direction away from said platen a predetermined amount and returned to initial position on each revolution of the disc.

5. In a tabulating or like printing machine adapted to print accounts on the passage of a statistical card and having total taking mechanism including a total taking shaft, the combination with the total taking shaft of a disc freely mounted on a continuously driven shaft of the machine, a clutch between said driven shaft and the disc, settable disengaging means for said clutch including a settable connection between the total taking shaft and said disengaging means whereby the clutch may be engaged from said total taking shaft or continuously disengaged or engaged, a bar disposed parallelly with the machine platen, means disposed between said bar and said platen for holding stationary the paper which has passed the platen, whereby a bight of paper is formed, guides for the bar arranged in a plane transverse to said platen and at right angles thereto, bearings on said bar, a finger member hinged in said bearings, and means transmitting a reciprocating motion to said bar from said disc eccentrically connected to said finger member, whereby the finger member is pushed in a direction away from said platen a predetermined amount and returned to initial position on each revolution of the disc.

In testimony whereof we affix our signatures.

ARTHUR THOMAS.

FRANCIS GUY SYDENHAM ENGLISH.