

Nov. 3, 1936.

W. W. LASKER

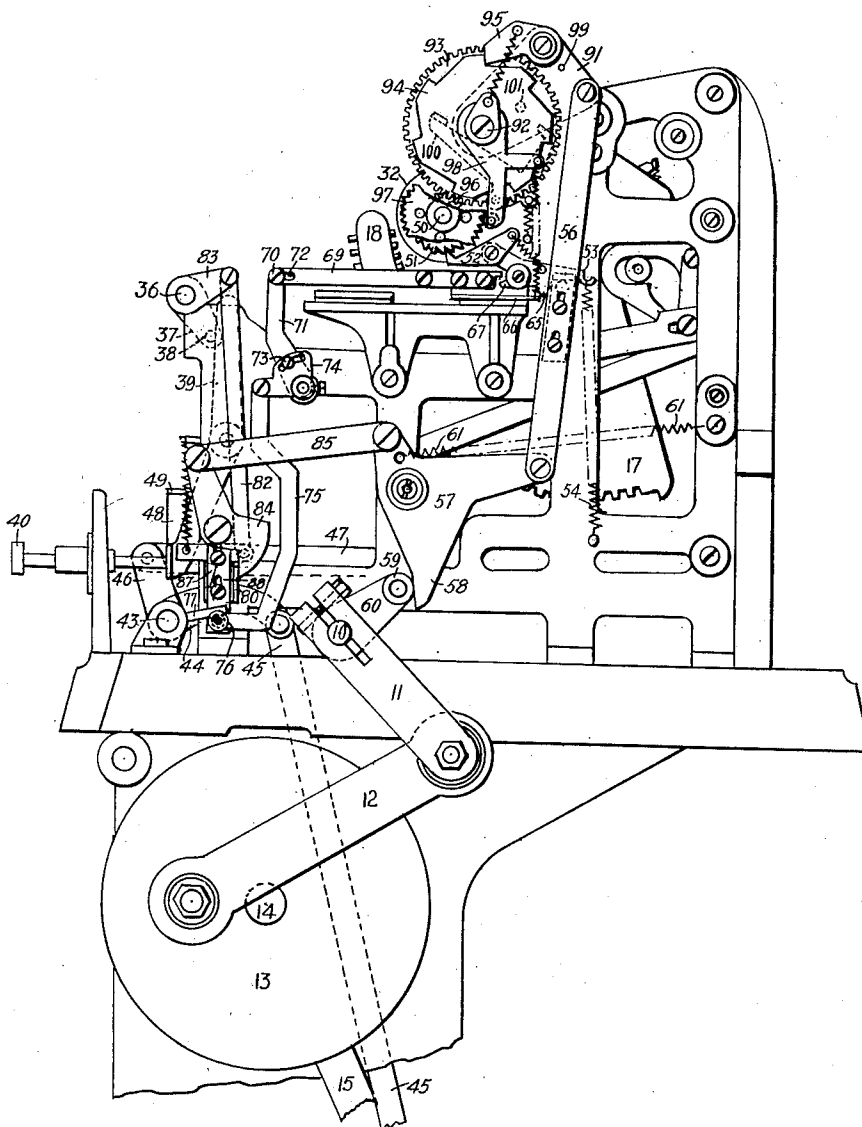
2,059,251

PRINTING AND PAPER FEEDING MECHANISM FOR ADDING MACHINES OR THE LIKE

Filed June 17, 1929

3 Sheets-Sheet 1

Fig 1



INVENTOR

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Nov. 3, 1936.

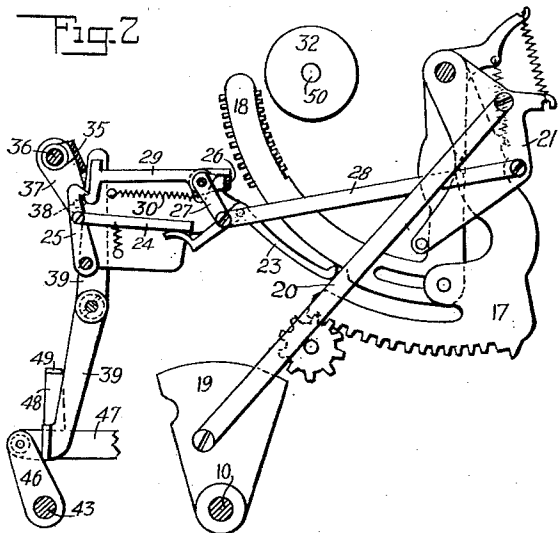
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PRINTING AND PAPER FEEDING MECHANISM FOR ADDING MACHINES OR THE LIKE

Filed June 17, 1929

3 Sheets-Sheet 2



31

105

106

Fig. 3

106

JOHN DOE CO. OSKOSH NEB.						
VENDOR INV NO. DATE		INVOICE NOS VENDOR USER CO		DUE DATE	AMOUNT D R	CASH DISC
					49 62	
					713 24	
					762 86	
JOHN DOE CO. OSKOSH NEB.						
VENDOR NO. DATE		INVOICE NOS VENDOR USER CO		DUE DATE	AMOUNT D R	CASH DISC
					246 41	
					48 16	
					315 23	
					609 80	
JOHN DOE CO. OSKOSH NEB.						
VENDOR NO. DATE		INVOICE NOS VENDOR USER CO		DUE DATE	AMOUNT D R	CASH DISC
					327 36	
					45 41	
					281 22	
					53 00	
					704 99	
JOHN DOE CO. OSKOSH NEB.						
VENDOR NO. DATE		INVOICE NOS VENDOR USER CO		DUE DATE	AMOUNT	
					963	
					43	
					39	

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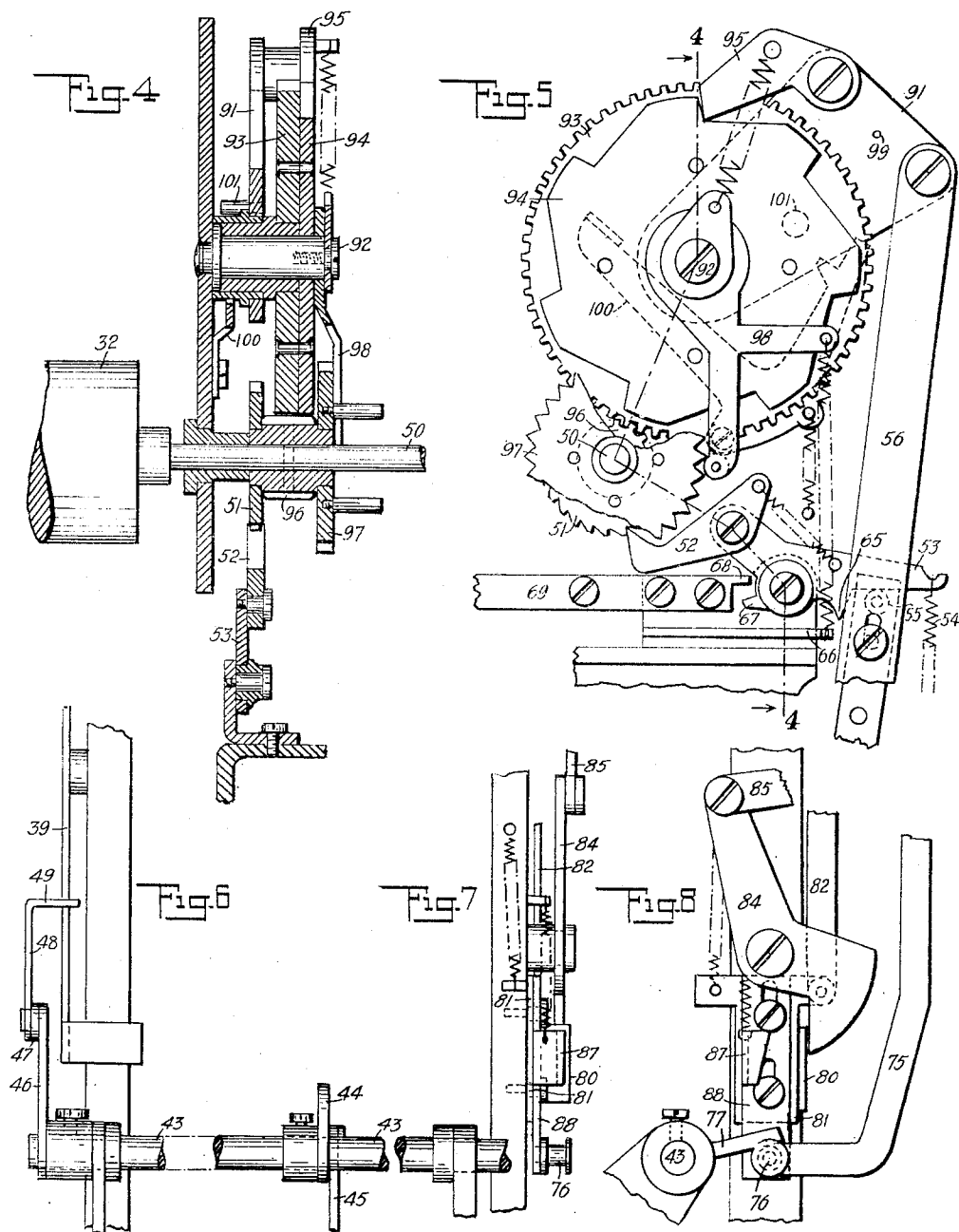
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PRINTING AND PAPER FEEDING MECHANISM FOR ADDING MACHINES OR THE LIKE

Filed June 17, 1929

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,059,251

PRINTING AND PAPER FEEDING MECHANISM FOR ADDING MACHINES OR THE LIKE

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Application June 17, 1929, Serial No. 371,373

13 Claims. (Cl. 235—58)

This invention relates to improvements in printing and paper feeding mechanisms for computing or like machines and is shown as applied to the well known Powers tabulator mechanism of the type shown in U. S. Letters Patent to Powers #1,236,481, August 14, 1917, and including an automatic total taking mechanism such as disclosed in U. S. Letters Patent to Lasker #1,376,555, May 3, 1921. The novel features of the invention are not limited to embodiment in this type of machine or to the total taking mechanism shown in these patents.

An object of this invention, generally stated, is the provision of automatic mechanism for feeding the paper variable distances after the total has been printed during a total taking operation, to present the first line of a new form or section of the paper to the printing line to receive the imprint of the first item of a new series of items, the mechanism operating to perform this function regardless of the number of items making up the total which are confined within the length of a single form or section.

A further object of my invention is to provide means for automatically effecting said variable feed of the paper in the event that the number of items on one form exceed the length thereof and have to be carried over onto the next succeeding form.

Another object is the provision of adjustable or shiftable means for controlling the single or double line spacing of paper and for variably spacing the paper automatically after the impression during a total taking operation.

A still further object is the provision of variable paper feeding means which can be manually thrown out of operation for any desired period as in cases where the items are printed on a plain strip of paper.

Another object is the provision of variable line spacing mechanism under control of printing and non-printing mechanism so that in non-listing operations the total alone will be printed on the paper or the individual forms or sections and the paper automatically advanced to position the next form to receive the next total impression.

With these, and other objects that will appear from the following description, the invention consists in the features of construction, arrangements of parts and combinations of devices set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings, in which like

reference characters designate corresponding parts in the various views,

Fig. 1 is a right-hand side elevation of the upper portion of a Powers tabulator showing the invention applied thereto and with the paper feed mechanism shown in the position it occupies at the end of an actuation,

Fig. 2 is a fragmentary, detail, fore and aft, vertical sectional view showing portions of an adding and printing section,

Fig. 3 is a fragmentary face view of a portion of the paper strip,

Fig. 4 is a detail, vertical transverse sectional view of the variable spacing and single and double line spacing mechanisms drawn on a larger scale than Fig. 1, the section being taken on the line 4—4 of Fig. 5 and looking in the direction of the arrows at said line,

Fig. 5 is a detail, fragmentary, side view of that portion of the spacing mechanisms shown in Fig. 4, the parts being shown in the same positions as in Fig. 1,

Fig. 6 is a fragmentary, detail front view of the means for controlling the hammer locking bail,

Fig. 7 is a fragmentary, detail edge view of the mechanism for permitting line spacing and for throwing out the line spacing control to permit the variable feed mechanism to function, and

Fig. 8 is a side view of some of the mechanism shown in Fig. 7.

The tabulator to which the invention is shown applied is a well known form of Powers tabulator comprising a base in which the main operating shaft (not shown) is journaled. Fig. 1 shows the adding and printing head comprising the usual main adding rock shaft 10 driven by an arm 11 and a link 12 connecting the arm to a disk 13 mounted on a shaft 14 driven by beveled gears (not shown) from a shaft 15 driven from the main shaft (not shown) in the base of the machine.

The shaft 10 has its usual function of permitting the setting of adding racks 17 and type carriers 18 under the control of a pin box and of restoring the racks and carriers after the printing operation has been performed. This mechanism comprises a fan cam 19 (Fig. 2) on the rock shaft 10 connected by a link 20 to the usual restoring frame 21.

As in the usual construction the movement of any type carrier 18 from its home position is effective through a cam thereon to coact with one arm of an associated bell crank 23 and shift the latter in a clockwise direction, as the parts appear

in Fig. 2. The other arm of this bell crank under-
lies the free end of an associated releasing or
actuating bar 24 pivoted at its other end to the
companion hammer releasing pawl 25. The
clockwise movement of the bell crank 23 referred
to above is effective therefore to elevate the free
end of the companion bar 24 into the path of
movement of a ball 26 which is actuated in a
manner to be presently described. This ball is
adapted to coact with all of the bars 24 elevated
into the path thereof and to simultaneously move
them lengthwise and release the companion pawls
25, thereby permitting the corresponding ham-
mers 28 to be impelled against the selected types
in the paths of the hammers and effect printing
on a paper strip 31 (Fig. 3) carried by the
platen 32.

The ball 26 is operated by a crank arm 27
fixedly connected therewith, and a link 28 is con-
nected at one end to said crank arm and is con-
nected at its other end to the restoring frame 21.
The ball functions at the end of the forward
stroke or rocking motion of the shaft 10 and after
all of the type carriers have been set.

The adding and printing head usually com-
prises a number of adding and printing sections.
For the purpose of non-listing added items, a
ball 35 (Fig. 2) is provided which is carried on a
shaft 36 and when set in the position shown in
this figure blocks the firing action of all of the
hammers, by engagement therewith of the shoul-
ders on the hammers with which the release
pawls 25 normally cooperate.

For controlling the ball 35 the left-hand end of
the shaft 36 carries an arm 37 secured thereto
and provided with a pin 38 against which bears
one end of a lever 39. The free inner end of a
sliding stem which carries a print push button 40
(Fig. 1) bears against the lower end of the lever
39 and is adapted to actuate the latter by a rear-
ward movement of said button 40. Said button
and its carrying stem may be locked in the in-
ward print position by any well known means.
When the button 40 is moved to the inward posi-
tion it moves the lever 39 to swing the ball 35 out
of position to block the movement of the hammers
28, the ball assuming the blocking position when
the button is moved out to its outer non-print
position. The lever 39 also is automatically con-
trolled in a manner which will hereinafter appear.

As shown in the said patent to Lasker, a total
control shaft 43 (Figs. 1, 2, 6 and 7) is provided to
control the machine to print a total by mechan-
ism not herein disclosed. This shaft is oper-
ated by an arm 44 and link 45 (Fig. 1) running
into the base of the machine as usual in the well
known form of tabulator to which the invention
is shown applied, and as shown in said patent to
Lasker, to initiate a total taking operation. This
shaft 43 carries an arm 46 at its left-hand end,
and connected to said arm is a link 47 operating
the zero stops (not shown) in total printing.
Said link has an upstanding arm 48 (Figs. 1, 2
and 6) provided with a laterally extending por-
tion 49 bearing against said lever 39 to move said
lever counter-clockwise (Figs. 1 and 2) to lower
the ball 35 and permit the hammers to fire during
total taking operations even when the push but-
ton 40 is in its outer position to cause non-print-
ing of items.

The paper is fed by the usual cylindrical platen
32 operating in conjunction with the usual feed
rollers, not shown. The platen is mounted on a
shaft 50 carrying a feeding or line spacing
ratchet wheel 51 at its right-hand end. This

line spacing wheel (Fig. 5) is operated by a line
spacing or feeding pawl 52 spring pressed into
engagement with the wheel 51 and carried on one
end of a lever 53 urged clockwise by a spring 54 to
retract the pawl 52. This clockwise movement
is permitted upon lowering of a pin 55 (Fig. 5)
carried on a slide adjustably mounted on a link
56. The link 56 (Fig. 1) is lowered by a three
armed lever 57 to one arm of which it is con-
nected, and which lever has a depending arm 58
bearing against a roll 59 on an arm 60 secured to
the rock shaft 10. As the shaft 10 is rocked for-
ward, or in a counter-clockwise direction as the
parts appear in Fig. 1, the arm 58 is urged by a
spring 61 to follow it and thereby lower the link
56. When the rock shaft 10 is returned, the arm
60 rotates the lever 57 counter-clockwise and
raises the link 56 thereby rocking the lever 53
counter-clockwise to carry the feeding pawl 52 in
a feeding direction to single or double line space
the platen and the paper controlled thereby, as
will hereinafter more clearly appear.

In the construction as shown in the present in-
stance the maximum movement of the line spac-
ing pawl 52 is limited to two line spaces which is
determined by engagement of a projection 65 on
the lever 53 with a fixed portion or stop 66 in
the return movement of said lever to normal posi-
tion, as will be understood from an inspection of
Fig. 5 which shows the parts including the line
spacing pawl 52 in the actuated position. The
forward lower side of the lever 53 is provided with
a short arm 67 (Fig. 5) for engagement with a
projection 68 on a bar 69 to limit the return move-
ment of the lever 53 and thus determine the extent
of the throw of the pawl 52 to feed the platen and
paper a single line space only. The bar 69 may be
operatively connected by a set screw 70 (Fig. 1)
to an arm 71 pivoted on a stud, said bar being
normally maintained either in its functioning
position as shown, where it controls the pawl 52
for single line spacing, or in a non-functioning
position, as permitted by the slot 72 in the bar. It
may be explained at this time that when properly
adjusted the bar 69 is automatically controlled in
its movement into and out of functioning position
as will presently appear. In the non-functioning
position of this bar, the pawl 52 is controlled by
the projection 65 and stop plate 66 to effect double
line spacing of the paper. The actual contact
edge of the plate 66 with which the projection 65
coacts is to the left of and back of the projection
on which the spring for the part 98 is attached, as
the parts appear in Fig. 5, so that the requisite
extent of throw of the member 53 for double line
spacing is provided for.

The arm 71 is adjustably connected by a clamp-
ing screw 73 to a coaxially pivoted arm 74, the
stem of the screw passing through a slot in the
arm 74 and received at its threaded end in a
tapped opening in the arm 71. The arm 74 is
connected to a link 75 (Figs. 1, 7 and 8) which at
its lower forwardly extending end is connected
with a stud 76 on a slide 88 to be hereinafter de-
scribed, and said stud is actuated by an arm 77
on the total control shaft 43. The link 75 has
been omitted in Fig. 7 to avoid confusion in the
showing of the other parts. By this train of
mechanism, the bar 69 when set for single line
spacing control, as in Figs. 1 and 5, will be moved
to the left from the position shown in these
figures, to withdraw the stop 66 and permit the
pawl 52 to double line space after the total has
been printed.

The line spacing mechanism is disabled when the hammer lock 35 is set to prevent printing. In the present instance this is done by blocking means comprising a lateral flange or stop 80 (Figs. 1, 7 and 8) on a slide 81 connected by a link 82 with an arm 83 on the right-hand end of the shaft 36 carrying the non-print ball 35 hereinbefore described. When the ball is in the non-print position shown in Fig. 2, the flange 80 will block the movement of a lever 84 connected by link 85 to the three armed lever 57 and thereby prevent retracting movement of the feed pawl 52 from its actuated position, but this block will be removed and the paper feed mechanism rendered operative whenever the hammer lock is set to allow printing.

When the push button 40 is moved inward, it positions the ball 35 as hereinbefore described to permit item printing and by the actuation of the shaft 36, crank arm 83 and link 82, lowers the flange 80 out of the path of the lever 84, permitting this lever to rock against a stop 87 on a slide 88 which permits the three armed lever 57 to rock sufficiently far to retract the pawl 52 for double line spacing movement. The slide 88 has the stud 76 before referred to connected thereto so that this slide will be lowered by the arm 77 to move the stop 87 out of the path of the lever 84 whenever the total control shaft 43 is rocked clockwise from the position shown in Fig. 8. This is for the purpose of permitting the three armed lever 57 to lower the link 56 a distance sufficient to bring about a feed of the paper through a maximum distance. Such maximum distance is equal to the length of a form, but the actual extent of the feed is a variable distance depending on the number of lines written, and is for the purpose of bringing the first line of a succeeding form in printing position after a variable number of items and their total have been printed as will now be explained.

The variable feeding mechanism by which the above mentioned result is attained comprises the link 56 connected to an arm 91 pivoted on a stud 92 on which are mounted a gear wheel 93 and ratchet disk 94 connected together for movement in unison. The ratchet disk 94 is adapted to be operated by a pawl 95 carried by the arm 91 and held in cooperation with the toothed edge of the disk 94 by a spring. Movement is communicated from the gear wheel 93 to the platen shaft 50 by an intermeshing pinion 96 secured to said shaft and on which the ratchet wheel 51 and an aliner disk 97 are mounted, as shown in Figs. 4 and 5. The aliner disk 97 is provided with studs on which the usual hand feed knob (not shown) is mounted and by which the platen may be turned at will. Cooperating with the teeth of the disk 97 is the usual detent roller carried by a spring-drawn retaining or roller-detent-carrying lever 98.

It will be understood that the two ratchets 51 and 94 are geared together by pinion 96 and gear 93, so that an advance of either of them advances the other also. Pinion 96 is of much smaller diameter than ratchet 51, and, therefore, when the platen is turned a single line space distance the periphery of ratchet 94 moves a less distance than that of ratchet 51.

The variable feeding mechanism may be disabled by throwing the pawl 95 (Fig. 5) to the right against a stud 99 on the arm 91, thus holding the pawl out of cooperative relation with the ratchet wheel 94. The effect of thus shifting the pawl 95 to and maintaining it in ineffective position is to render the variable feed mechanism inoperative without, however, interfering with the operation of the link 56, and the line spacing

lever 53 controlled thereby, for effecting single and double line spacing, as hereinbefore described.

A manipulative three arm lever 100 pivoted at 101^a (Fig. 4) is provided to engage a stud 101 on the arm 91 and thereby prevent a downward movement of the arm 91 and link 56 from the actuated Fig. 5 position. The result of this is to prevent a retractive movement of the pawls 52 and 95 and thereby disable the entire paper feeding mechanism.

An example of a strip of paper 31 used in connection with this invention is shown in Fig. 3. This strip contains printed forms 105 separable along perforated lines 106 as indicated. The paper is inserted and adjusted to the first line space of the first form. Various information may be printed under headings as indicated. Following each listing operation the paper is fed a single line space or a double line space accordingly as it is controlled by the position of the bar 69. The items are listed in succession and the maximum number of items on a form may vary in accordance with the predetermined construction of the variable line spacing mechanism and the length of the forms. After any variable number of items have been listed, a total card follows a space card, or the well known total designation control mechanism (not shown), initiates a total taking operation. This results in rocking the total shaft 43 clockwise from the position shown in Fig. 1. It may be remarked at this point that when a space card is reached the machine is caused to cycle, without however effecting a computing or printing operation other than to reset the carrying devices in the computing mechanism where these have been operated. The operation of the machine thus brought about by the space card results in cycling the disk 13 and effecting an operation of the pawl 52 to advance the platen a blank line space. When now a total card follows the space card as indicated above, the total will therefore be written a double line space from the last written item, as shown in each instance in Fig. 3. Every actuation of the total shaft 43, initiated by the total card mentioned above, results in drawing the bar 69 forward so that the pawl 52 is moved far enough to effect a double line space movement of the platen, and in the case where the pawl 95 has been thrown out of use the next item after the total will therefore be printed a double line space distance from the total as indicated below:

49	62	-----	item
713	24	-----	item
762	86	-----	total
246	41	-----	item

This character of double spacing after the printing of a total is particularly useful when straight listing on a continuous unprinted sheet is effected.

When the pawl 95 is in operation advancing the paper to the head of the next form the pawl 52 makes its motion of a double line space, but ineffectively, because the platen is then turned by the pawl 95 which, acting through the pinion 96 of relatively small diameter, causes the ratchet wheel 51 to move forward more rapidly than the pawl 52. In that use of the machine, which is the use illustrated in Fig. 3, the variable line space pawl 95 is retracted a distance slightly greater than the length of a ratchet tooth on the ratchet disk 94, such retraction being permitted by the withdrawal of the limiting stop 87. On the return stroke of the shaft 10 on the total

printing cycle, the pawl 95 is advanced and picks up the ratchet tooth over which it has been retracted and moves it into the position shown in Fig. 5, thereby feeding the work sheet to bring the first line of the next form into printing position.

It will be understood that the pawl 95 is given a predetermined uniform feeding stroke at each total printing operation, sufficient to advance the paper a distance equal to the length of a form. However, during listing operations the ratchet wheel 94 has been advanced step by step relatively to the pawl 95 by the pawl 52 through the gears 93, 96, a distance depending upon the number of items listed. Then when the pawl 95 is given its operating stroke after the total printing operation, a portion of the predetermined movement of the ratchet 94 has already occurred and the pawl 95 will pick up the corresponding ratchet tooth where it finds it and will complete the advance of the ratchet to the position shown in Fig. 5, thus moving the paper through a distance which, with the distance the paper has been moved during listing, will complete the predetermined total distance necessary to bring the first line of the succeeding form into printing position to receive the first item of the new series. During listing operations the pawl 95 is arrested by stop 87 and therefore does not retract sufficiently to be operative upon the ratchet wheel, except as now to be described.

Thus in the event of there being more items to be entered before taking a total than is provided for by the length of a single bill form, the additional entries will be automatically carried over onto the next bill form, the operation in this connection being as follows:

During listing operations, the link 56 reciprocates at each printing cycle a distance limited by the stop 87. Each such reciprocation produces a reciprocation of each of the pawls 52 and 95, the former line spacing the platen and paper as above described. This limited reciprocation of the pawl 95 is ordinarily an idle one, because the pawl is not drawn back far enough to snap in behind a new tooth of the ratchet 94, but only rubs back and forth a certain distance on the inclined side of the tooth. However, each step imparted to the platen by the pawl 52 turns the ratchet 94 forward, so that as a column of figures is printed, the next tooth of ratchet 94 gradually creeps toward the front of the machine. By the time an item has been printed on the last line of a form, this on-coming tooth will have reached a position so near to the normal position of pawl 95 that when said pawl is drawn back to its usual limited distance, the pawl will drop in behind said tooth, and when the pawl is then advanced on the return stroke of main shaft 10, said pawl will advance said on-coming tooth to the position shown in Fig. 5, which brings to printing position the first line of the next form, skipping the spaces containing the heading of such next form. It will be understood that even this limited movement of the pawl 95 turns the platen much further than pawl 52 can turn it, due chiefly to the fact that it acts through pinion 96 which is of much smaller diameter than ratchet 51. The next item will therefore be printed in the first writing line position of said next form. Successive items may continue to be entered on the second form until a total card (following a space card) is reached. This will result in printing the total two spaces from the last entered item as in the instance pre-

viously described. On the return motion of the rock shaft 10 the pawl 95 will be given a full feed motion, due to the fact that the stop 87 has been withdrawn by the rocking of the total taking shaft 43 as hereinbefore described, and will result in turning the platen an extent sufficient to bring the next bill form to a position where the next item may be entered in the first line thereof, and so on the operation may be repeated as hereinbefore described. In the instance just described, one list of items occupies two forms. It will be noted that this involves an operation of the pawl 95 on the ratchet 94 without a total taking operation.

What I claim as new and desire to secure by Letters Patent, is:

1. In a machine of the class described, in combination with mechanism for listing or non-listing items and automatically printing the total thereof, paper feeding mechanism, means for operating said paper feeding mechanism, means for blocking said operating means during non-listing operations, means for withdrawing said blocking means for listing operations, a second blocking means for limiting said operating means during listing operations, a total taking initiating mechanism, and means operated by said total taking initiating means for withdrawing said second blocking means.

2. In a machine of the class described, in combination with mechanism for listing items and printing totals thereof and a platen for positioning record receiving paper, of means for automatically line spacing the paper during listing operations, means for variably spacing the paper during total printing operations, a common operator for said two feeding means, and means for increasing the movement of the operator during total printing to permit of variable spacing during such operations.

3. In a machine of the class described for listing items and printing totals thereof, the combination of a paper feeding platen, a ratchet and feed pawl construction for line spacing the paper during listing operations, a second ratchet and pawl for spacing the paper incidental to total printing, a common link for operating said pawls, and means for automatically controlling the movement of said link in listing and total printing operations.

4. In a machine of the class described, in combination with mechanism for listing items and printing totals thereof, paper feeding means, means for limiting the extent of actuation of said feeding means to a single line spacing during listing operations, means for automatically withdrawing said limiting means during total taking operations to permit said feeding means to feed the paper a double line space, a second paper feeding means for feeding said paper after total printing operations variable distances depending upon the number of items listed and capable of being thrown out of operation, the construction being such that when said second feeding means is disabled said first paper feeding means will double line space the paper after a total taking operation has been initiated.

5. The combination of printing mechanism for listing various items computed, computing mechanism including total taking mechanism having means for controlling the printing of totals of items listed, line spacing mechanism for advancing the paper line by line as the items are listed, differential paper feeding means for feeding the paper variable distances depending on

the number of items printed in order to advance the paper from the last written line position on one form thereon to the first writing line position on the next succeeding form, and automatically operating means controlled by the operation of said total taking mechanism for bringing about an operation of said differential paper feeding means in timed relation with and after the total has been printed, whereby after a total has been printed the paper is automatically advanced from the last written line on one form to a position for writing the first line on the next succeeding form, said variable spacing means being also operable independently of the control of said total taking mechanism when the end of a printed form is reached, whereby when an end of a form is reached without taking the total the paper is advanced to bring the next form to a position where writing on the first line thereof may be effected.

6. The combination of printing mechanism, computing mechanism including total taking mechanism having means for bringing about a printing of the total from said printing mechanism, line spacing mechanism for advancing the paper a line at a time after each item has been listed, differential paper feeding means for feeding the paper variable distances depending on the number of items printed, automatically operating means controlled by the operation of total taking mechanism for automatically bringing said differential paper feeding means into operation in timed relation with and after the total has been printed by said printing mechanism, non-print mechanism for preventing said printing mechanism from printing the items without interfering with its printing totals, and means under control of said printing and non-print mechanisms for rendering said differential feed mechanism effective when said non-printing mechanism is effective, whereby in non-listing operations the total alone will be printed on the individual forms and the paper automatically advanced to position the next form to receive the imprint of the next total.

7. The combination of printing mechanism, computing mechanism including total taking mechanism having means for bringing about a printing of the total from said printing mechanism, line spacing mechanism for advancing the paper a line at a time after each item has been listed, differential paper feeding means for feeding the paper variable distances depending on the number of items printed, automatically operating means controlled by the operation of said total taking mechanism for automatically bringing said differential paper feeding means into operation in timed relation with and after the total has been printed by said printing mechanism, and means operating automatically on the operation of said total taking mechanism for causing said line spacing mechanism to advance the paper a double line space after the total has been taken, the combination including means shiftable to render said double line space means and said differential feeding means effective alternatively.

8. The combination of printing mechanism for listing items computed and printing totals, computing mechanism including total taking mechanism for controlling the printing of totals of the items listed, line spacing mechanism for advancing the paper line by line as the items are listed, differential paper feeding means for feeding the paper variable distances depending on

the number of items printed in order to advance the paper from the last written line position on one form thereon to the first writing line position on the next succeeding form and including means shiftable at will for rendering said differential feeding means effective or ineffective, means operating automatically when the differential feeding means are effective and controlled by the operation of said total taking mechanism for bringing about an operation of said differential paper feeding means in timed relation with and after the total has been printed, whereby after a total has been printed while the differential feeding means are effective the paper is automatically advanced from the last written line on one form to a position for writing the first line on the next succeeding form, and means operating automatically when the differential feeding means are ineffective and dependent on the operation of said total taking mechanism for causing said line spacing mechanism to advance the paper a double line space after the total has been taken.

9. The combination of printing mechanism for listing items computed, computing mechanism including total taking mechanism having means for controlling the printing of totals of the items listed, line spacing mechanism for advancing the paper line by line as the items are listed, differential paper feeding means for feeding the paper variable distances depending on the number of items printed in order to advance the paper from the last written line position on one form thereon to the first writing line position on the next succeeding form and including a pawl shiftable at will into and out of effective position for rendering said differential feeding mechanism effective or ineffective, means operating automatically when the differential feeding means are effective and controlled by the operation of said total taking mechanism for bringing about an operation of said differential paper feeding means in timed relation with and after the total has been printed, whereby after a total has been printed while the differential feeding means are effective the paper is automatically advanced from the last written line on one form to a position for writing the first line on the next succeeding form, and means operating automatically when the differential feeding means are ineffective and dependent on the operation of said total taking mechanism for causing said line spacing mechanism to advance the paper a double line space after the total has been taken.

10. The combination of printing mechanism for listing items computed, computing mechanism including total taking mechanism having means for controlling the printing of totals of the items listed, line spacing mechanism for advancing the paper line by line as the items are listed, differential paper feeding means for feeding the paper variable distances depending on the number of items printed in order to advance the paper from the last written line position on one form thereon to the first writing line position on the next succeeding form and including means operable at will for rendering said differential feeding mechanism effective or ineffective, means operating automatically when the differential feeding means are effective and controlled by the operation of said total taking mechanism for bringing about an operation of said differential paper feeding means in timed relation with and after the total has been printed, whereby after a total has been printed and the differential

feeding means are effective the paper is automatically advanced from the last written line on one form to a position for writing the first line on the next succeeding form, means operating automatically when the differential feeding means are ineffective and dependent on the operation of said total taking mechanism for causing said line spacing mechanism to advance the paper a double line space after the taking of a total has been initiated, non-print mechanism for preventing said printing mechanism from printing the items without interfering with its printing totals, and means under control of its printing and non-print mechanism for rendering the controlling means for said differential feed mechanism effective when said non-printing mechanism is effective, whereby in non-listing operations the total alone will be printed on the individual forms and the paper automatically advanced to position the next form to receive the imprint of the next total.

11. The combination of a line space pawl and ratchet capable of advancing the paper feeding mechanism for ordinary line spacing and reciprocated at each operation of the machine, a second line space pawl, a ratchet for said second pawl, said second pawl and ratchet arranged so that an advance of said ratchet a distance of one tooth advances the paper a predetermined distance which is greater than ordinary line spacing, and means limiting the reciprocation of said second pawl to less than a tooth space of said ratchet, the construction being such that after the paper has been fed a certain distance by the first recited pawl, the ratchet will have been advanced far enough to be engaged by said second pawl which will then advance the paper a plurality of line space distances.

12. The combination of a line space pawl and ratchet capable of advancing the paper feeding mechanism for ordinary line spacing and reciprocated at each operation of the machine, a second line space pawl, a ratchet for said sec-

ond pawl, said second pawl and ratchet arranged so that an advance of said ratchet a distance of one tooth advances the paper a predetermined distance which is greater than ordinary line spacing, and means limiting the reciprocation of said second pawl to less than a tooth space of said ratchet, the construction being such that after the paper has been fed a certain distance by the first recited pawl, the ratchet will have been advanced far enough to be engaged by said second pawl which will then advance the paper a plurality of line space distances, and means operating on occasion to cause said second pawl to reciprocate a distance appropriate to a full tooth-space of said ratchet, whereby the paper may be advanced at one step through whatever remains of a full operation of said second ratchet after one or more operations of the first recited pawl.

13. In a machine of the class described and including computing mechanism, item and total printing mechanism, total-taking means for bringing about a total printing operation, and means for line-spacing the paper, the combination which includes means controlled by said total-taking means for causing said line spacing means to impart a definite extra extent of feed to the paper following a total-taking operation, and a second paper feeding means controlled by said total-taking means and acting after the printing of a total to feed the paper forward to a variable extent depending on the number of items printed before the total, the combination including a device settable optionally to render said extra-spacing means and said variable-feed means operative alternatively, whereby in one setting of the machine successive lists and their totals may be printed and separated one from another by an extra space and in another setting of the machine the paper may be fed forward after printing a total to bring to printing position the first line of another bill form.

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