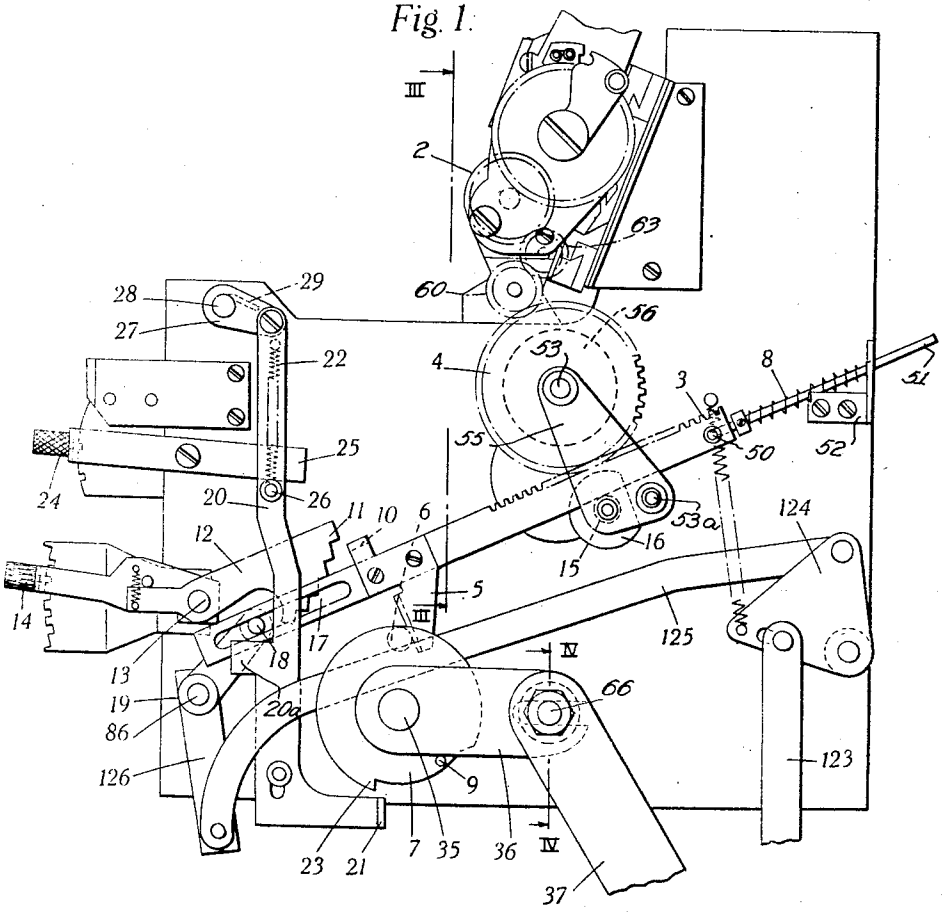
Sept. 23, 1941. A. THOMAS 2,256,693

PAPER FEEDING MECHANISM FOR STATISTICAL MACHINES

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Fig. 1.




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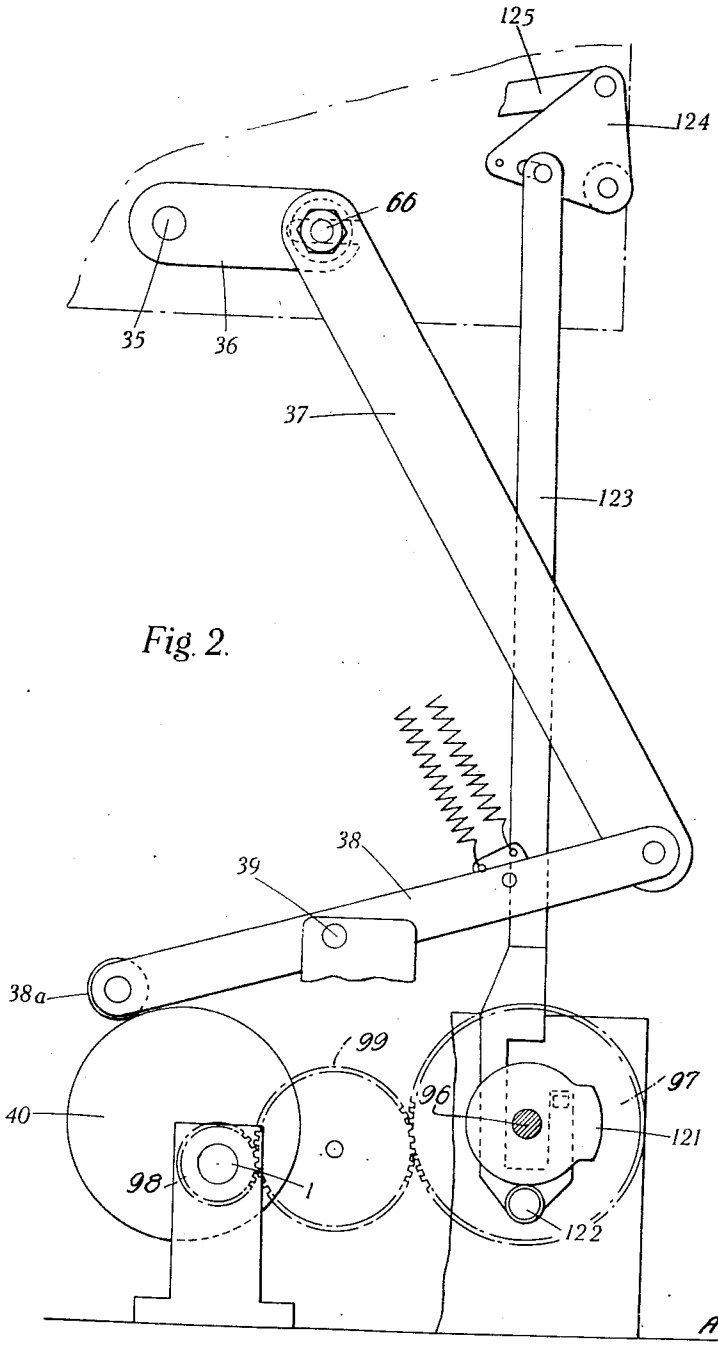



Fig. 2.

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Fig. 3

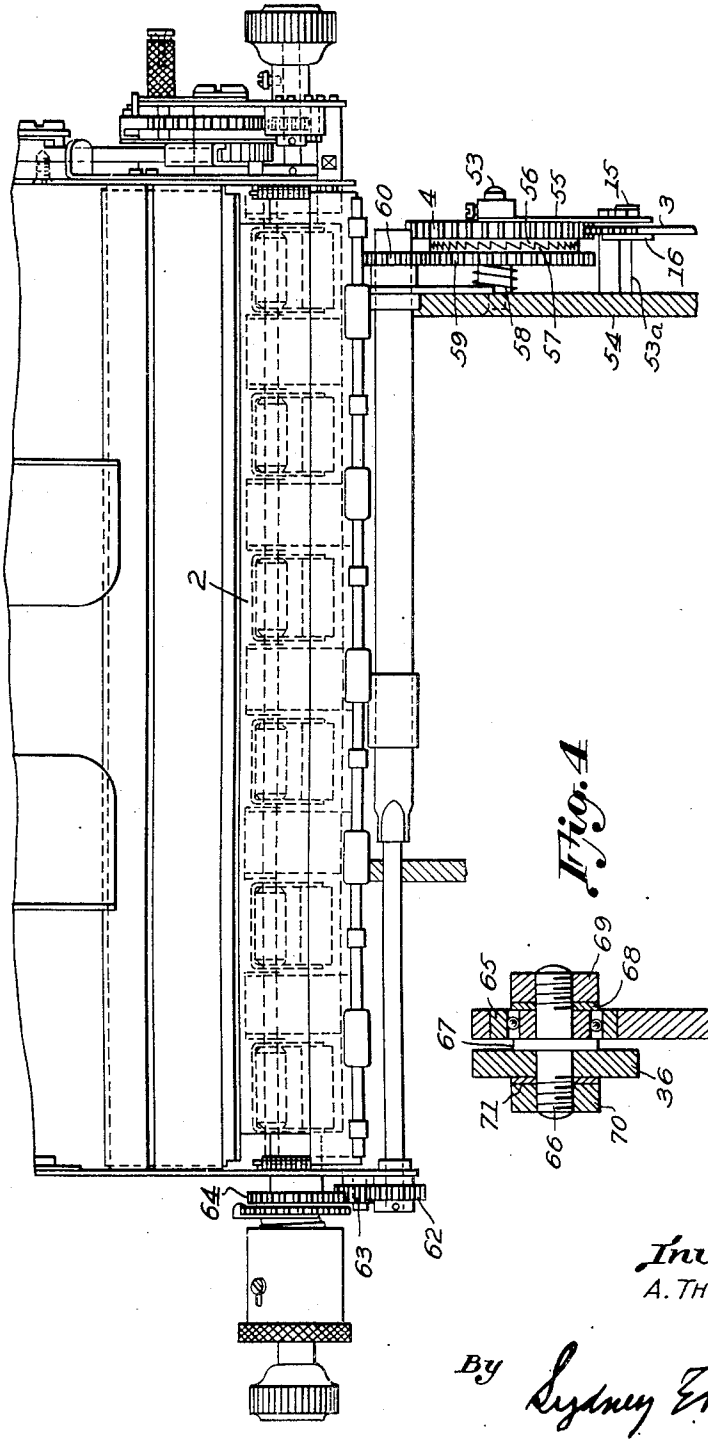



Fig. 4




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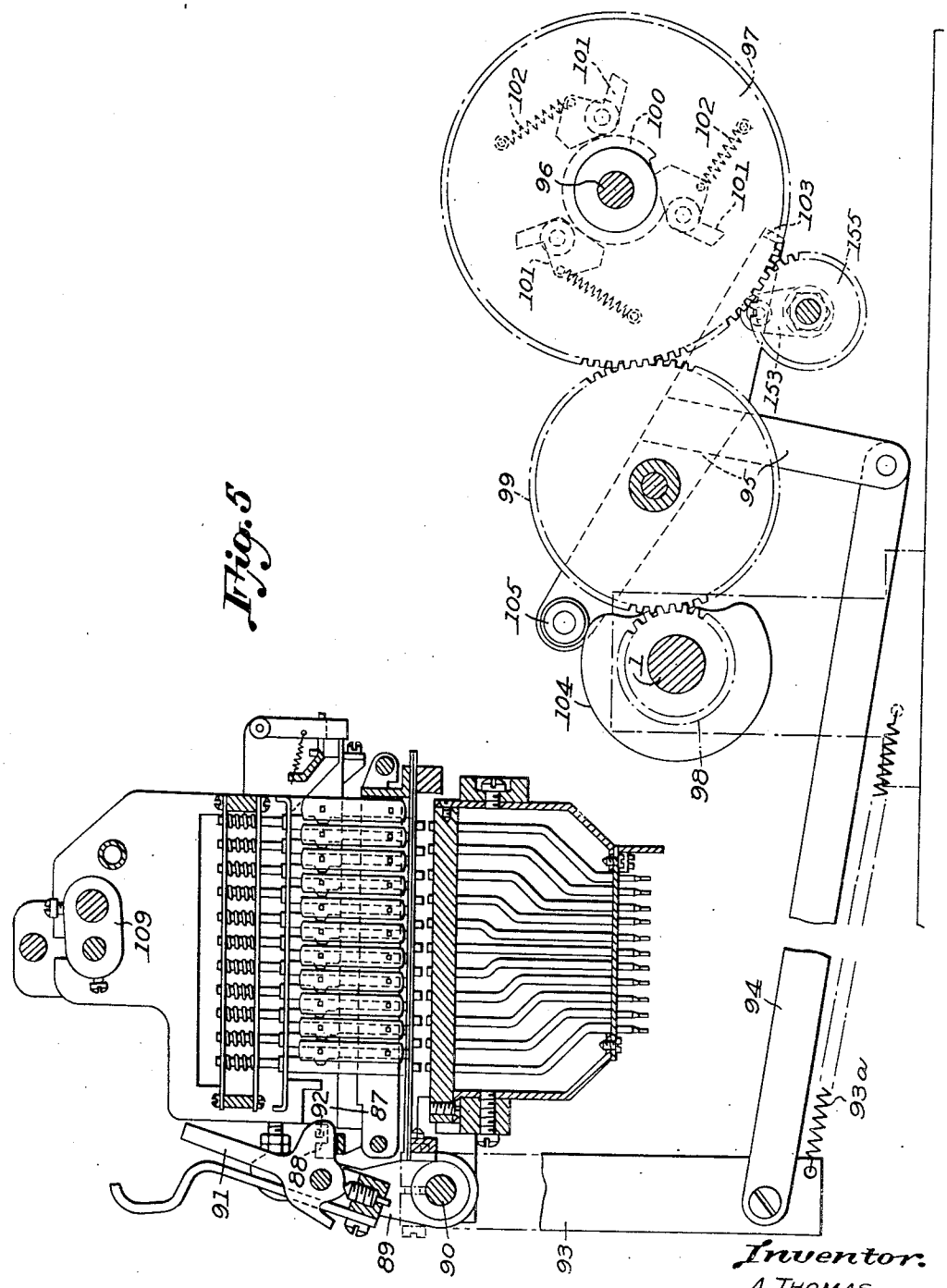



Fig. 5

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Patented Sept. 23, 1941

2,256,693

# UNITED STATES PATENT OFFICE

2,256,693

## PAPER FEEDING MECHANISM FOR STATISTICAL MACHINES

Arthur Thomas, Wallington, England, assignor to Powers Accounting Machines Limited, London, England, a company of Great Britain

Application October 1, 1937, Serial No. 166,821
In Great Britain October 10, 1936

1 Claim. (Cl. 235—61.9)

This invention relates to paper feeding control mechanism for statistical machines, such as record card controlled tabulating machines, calculating machines, typewriters and the like.

According to the present invention paper feeding control mechanism for statistical machines comprises in combination a driving member for the paper feeding mechanism, the extent of movement of said driving member determining the length of paper fed at each stroke thereof, means for actuating said driving member at each machine cycle through a lost motion device and means for varying the extent of lost motion whereby the length of paper fed may be adjusted.

According to a further feature of the invention, in calculating machines, means may be provided, operable under the control of the total printing mechanism of the machine for reducing the extent of lost motion when a total printing operation occurs, whereby a greater length of paper is fed after a total has been printed.

In order to explain the invention more fully the invention will now be described by way of example as applied to a record card controlled tabulating machine, and with reference to the accompanying diagrammatic drawings in which:

Fig. 1 illustrates the mechanism according to the invention in elevation.

Fig. 2 shows a part of the tabulator including the mechanism for driving certain shafts shown in Fig. 1.

Figure 3 is a view in section on the line III—III of Figure 1, and

Figure 4 shows a detail of construction.

Figure 5 shows the total taking control mechanism of the machine.

In the construction shown in the drawings the paper is fed by rotating the platen **2** through a ratchet mechanism operated by a reciprocating driving member in the form of a rack **3**. Reciprocation of the rack causes the wheel **4** to oscillate and the ratchet mechanism is disposed between the wheel **4** and the platen.

The rack **3** is pivoted at its left hand end (Fig. 1) by means of a slot **17** engaging a pin **18** on an arm **19** secured to a shaft **86** and at its right hand end the rack **3** is pivoted at **50** to a rod **51** passing freely through a hole in a fixed bracket **52**.

Engaging with the rack **3** is a toothed wheel **4** freely mounted on a stub **53** projecting from the frame member **54** (Fig. 3) and supporting a bracket **55** which is also supported by a stud **53a**.

In order to maintain the rack **3** in engagement with the wheel **4** the rack is guided on a roller **15** having a large flange **16**, the rack passing between this flange **16** and the bracket **54** (Fig. 3).

Co-axially secured to the rear face of the wheel **4** is a ratchet wheel **56** held in engagement with a second ratchet wheel **57** by means of a spring **58** (Fig. 3). The ratchet wheel **57** is secured co-axially to a gear wheel **59** freely mounted on the stub **53**, and the gear wheel **59** engages a pinion **60** secured to a shaft **61**. At its other end (Fig. 3) the shaft **61** has secured to it a pinion **62** engaging with a gear wheel **63** which in turn meshes with a gear wheel **64** secured to the shaft of the platen **2**.

When the rack **3** is moved to the left in Fig. 1 the wheel **4** rotates clockwise and the teeth of the ratchet wheel **56** slip over those of the ratchet wheel **57** so that the platen **2** is not rotated. When the rack **3** moves to the right the ratchets **56** and **57** transmit the motion to the platen.

The rack **3** has a projection **5** which, in the position of rest of the machine, is held against a pin **6** in a driving disc **7** by means of a spring **8** disposed around the rod **51**. In this position the rack is at the end of its feeding stroke.

The disc **7** is freely mounted on the sector restoring shaft **35** of the tabulator and carries a pin **9** abutting against an arm **36** secured to the shaft **35** which, as described in my co-pending patent application Serial No. 166,822 entitled "Improvements in calculating machines," filed October 1, 1937, is oscillated from the main shaft **1** of the tabulator by means of the arm **36** connected by a link **37** to one end of a lever **38** pivoted to the machine frame at **39** and of which the other end carries a roll **38a** engaging a cam **40** secured to the main shaft **1** (see Fig. 2). The connection between arm **36** and link **37** is as follows (Figs. 1 and 4):

Secured within the upper end of link **37** is a ball bearing **65** through which passes a stud **66** having a shoulder **67** located between the members **36** and **37**. This shoulder **67** is smaller in diameter than the outer race of the ball bearing **65** and on the opposite side of link **37** is disposed a washer **68**. The inner ball race is clamped between washer **68** and shoulder **67** by means of a nut **69** and a second nut **70** clamps the arm **36** between a washer **71** and the shoulder **67**.

Thus although the stud **66** together with the inner ball race is clamped to the arm **36**, the outer ball race is free and link **37** can therefore swing about the inner ball race.

At each revolution of the main shaft **1** the shaft **35** is rocked counter-clockwise in Fig. 1 and then back again. When the shaft **35** rocks

counter-clockwise the projection 5 bearing on the pin 6 under the action of spring 8 turns the disc 7 until a lug 10 on the rack 3 engages one of a series of steps 11 formed on an adjustable abutment member 12.

The member 12 is pivoted at 13 and has a handle 14 by means of which any one of the steps 11 may be placed in the path of the lug 10.

If the member 12 is set with the highest step 11 in the path of the lug 10 the rack will not be able to move at all, whereas if the second step is in the path of the lug as shown the rack will follow the movement of the pin 6 until the lug 10 engages the second step. The arm 36 will then continue its movement counter-clockwise and on the return movement clockwise engages the pin 9 thereby carrying the disc 7 and pin 6 back to the initial position whereby the rack is also returned to the initial position. This return movement of the rack feeds the paper one line space.

If the third step 11 is disposed in the path of the lug 10 the rack will move with the arm 36 until the lug 10 engages the third step and then on the return movement will feed the paper two line spaces.

Thus by means of the handle 14 the extent to which the rack follows the counter-clockwise movement of the arm 36 and therefore the extent of feed at each revolution of the main shaft 1 can be predetermined.

On a total cycle it is desired to feed the paper to a greater extent in order to separate the items constituting one account from those constituting the next account.

As already mentioned the left hand end of the rack 3 is slotted at 17 (Fig. 1) to engage with a pin 18 carried by an arm 19 secured to a shaft 86 which is displaced angularly when a total cycle occurs.

The shaft 86 is rocked by a cam 121 secured to the total shaft 96, this cam acting on a roller 122 on a link 123 which is pivoted to a bell crank plate 124 connected by a link 125 to an arm 126 secured to the shaft 86 (Figs. 1 and 2).

The shaft 96 is caused to make one revolution when a change in designation is detected by the designation pin box P.

The designation pin box P is constructed in substantially the same manner as the pin box described in United States Patent No. 1,661,684 issued March 6, 1928, and includes a plurality of testing bars 87, one for each column (Fig. 5).

Each testing bar is formed with a slot 88 at one end, this slot being open upwardly and disposed adjacent the slotted ends of the testing bars is a frame 89 secured to a shaft 90 and carrying a number of pivoted latches 91, one for each testing bar. Each latch has a projection 92 which can engage in the slot 88 in the end of its associated testing bar when the latch is moved to a given position. By this means any desired number of the testing bars 87 can be coupled to the frame 89.

At each cycle of the machine, as long as there is agreement between successive cards passing through the designating pin box, all the testing bars 87 are free to reciprocate as described in specification No. 1,661,684 and they therefore permit rocking of the frame 89 together with the shaft 90 to which it is secured. When, however, there is disagreement between two successive cards one or more of these testing bars 87 will be arrested and consequently the frame 89 will fail to rock.

Also secured to the shaft 90 carrying the frame is a lever 93 connected through a link 94 to a clutch control lever 95 serving to control a clutch for connecting the shaft 96 to the tabulator main shaft 1.

This clutch comprises a disc 97 which is continuously rotated from the tabulator main shaft through a gear wheel 98 secured to the main shaft and engaging a gear wheel 99 which in turn engages teeth on the periphery of the disc 97, the gear ratio being such that the disc 97 makes one revolution to each three revolutions of the main shaft 1.

Secured to the total shaft 96 is a driven clutch member 100 and secured to the disc 97 which is driven from the main shaft are three latches 101 which are normally held by springs 102 in such a position that any one of the latches would engage the clutch member 100 and rotate the total shaft 96.

Normally however the clutch control lever 95 is in such a position that as the disc 97 rotates a lug 103 on the clutch control lever engages each latch 101 as it comes round and deflects it from the clutch member 100 so that it does not engage therewith and the total shaft 96 remains stationary. When a total cycle is to occur, however, the clutch control lever 95 is held out of the path of the latches 101 and consequently one of these latches engages with the clutch member 100 and causes rotation of the total shaft.

Secured to the main shaft 1 is a cam 104 with which engages a roll 105 on one end of the clutch control lever 95, the roll 105 being held in engagement with the cam 104 by a spring 93a attached to the lever 93. The cam 104 is so shaped that while a card is entering the designating pin box 6 and is being sensed the cam 104 holds the clutch control lever 95 clear of the latches 101 on the aforesaid disc 97. Just before the testing bars 87 commence to reciprocate however the cam 104 releases the clutch control lever 95 which can then move into the path of the latches 101 under the action of spring 93a provided that all the testing bars are free to move, that is to say provided that there is no change in designation. If, however, there is a change the testing bars 87 will fail to move and consequently the frame 90 to which they are connected by their respective latches 89 will also fail to move and this frame, being connected to the clutch control lever 95, will also hold the latter out of the path of the latches 101 on the clutch control disc 97 so that the total shaft 96 will be coupled to said disc and will make one revolution.

When the shaft 86 rocks on a total cycle the arm 19 lowers the rack 3 with respect to the abutment 12 so that the lug 10 comes into a position in line with the next lower step 11 whereby the extent of movement permitted to the rack 3 is increased and accordingly the length of paper fed is also increased.

In order to render the paper feed inoperative during item printing cycles but operative on a total cycle when desired a latch is provided for the disc 7. This latch comprises a slide 20 having a lug 21 which is urged into engagement with a shoulder 23 on the disc 7 by a spring 22. A control handle 24 of which the other end 25 bears on a pin 26 on the slide normally holds the lug 21 clear of the shoulder 23. When the handle 24 is moved down the spring 22 pulls the slide up so that the lug 21 engages the shoulder 23 and prevents movement of the disc 7.

On a total cycle the pin 18 strikes a lug 20a

on the slide 20 and moves it to bring the lug 21 clear of the shoulder 23 so that the rack 3 is allowed to operate.

By constructions according to the invention the advantage is obtained that on a total cycle the length of paper fed is automatically increased without the necessity for any manual adjustment.

What I claim is:

In a record controlled tabulating machine of the kind having total taking control mechanism and means for initiating an operation of said mechanism when a change in group designation occurs, the combination of a paper feeding roller, a reciprocating driving member for said roller, a one-way connection between said roller and said driving member whereby movement of said driving member in one direction operates the roller to feed the paper and movement of said driving member in the other direction does not operate the roller, an adjustable stop disposable in the path followed by the driving member when moving in the non-operative direction, said stop being settable to any one of a predetermined number of positions exceeding two, each position corresponding to a different length of paper feed, an actuating member having a constant stroke, means for operating said actuating member at each machine cycle, means causing the driving member, during its non-operative movement, to follow the movement of said actuating member until arrested by the adjustable stop, whereby the actuating member continues its movement, leaving the driving member behind to be picked up by the actuating member on the return stroke thereof, and then driven positively to operate the paper feeding roller, and means operable under the control of the total taking control mechanism to adjust the relative positions of the adjustable stop and the driving member to increase the length of paper fed at a total taking operation whatever the original setting of said adjustable stop may be.

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