May 7, 1968 G. RICCIARDI ETAL 3,381,955

AUTOMATIC DOCUMENT FEEDING DEVICE FOR A PRINTING MECHANISM OF AN ADDING OR ACCOUNTING MACHINE

Filed Oct. 3, 1966 3 Sheets-Sheet 1

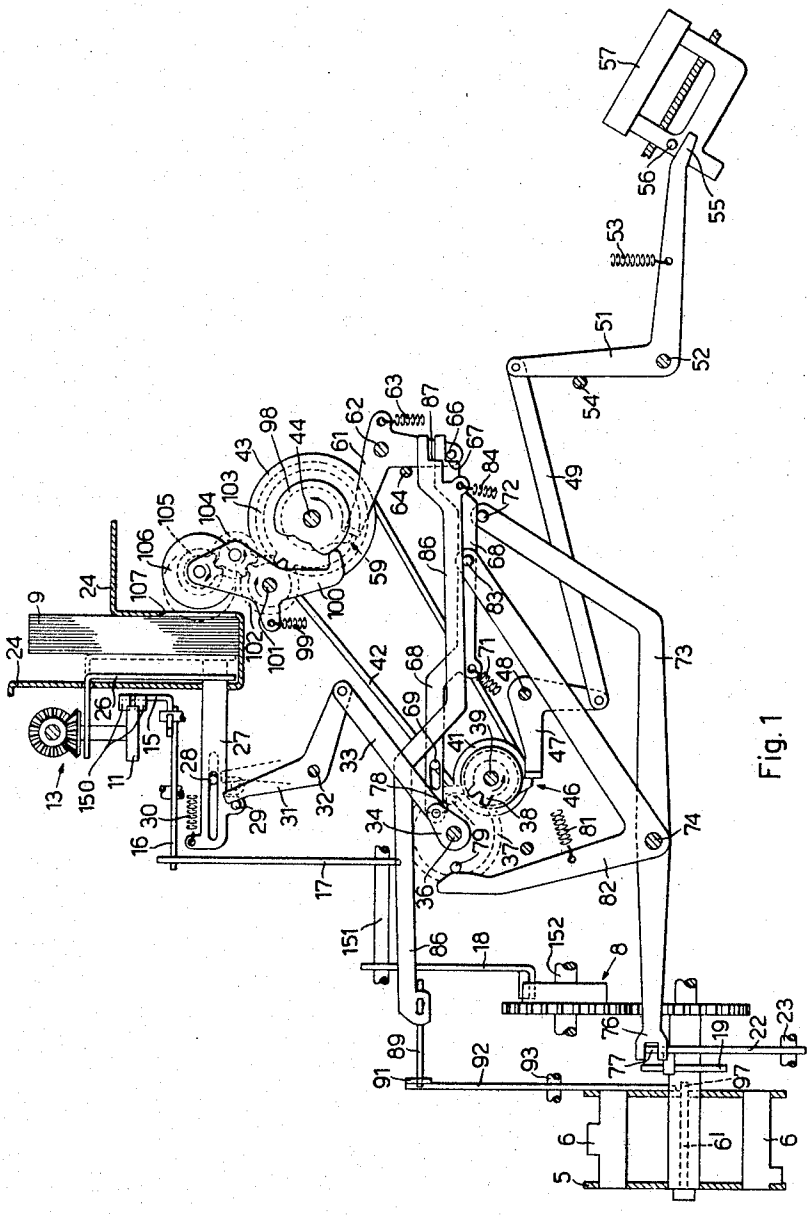

Fig. 1

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Filed Oct. 3, 1966 3 Sheets-Sheet 2

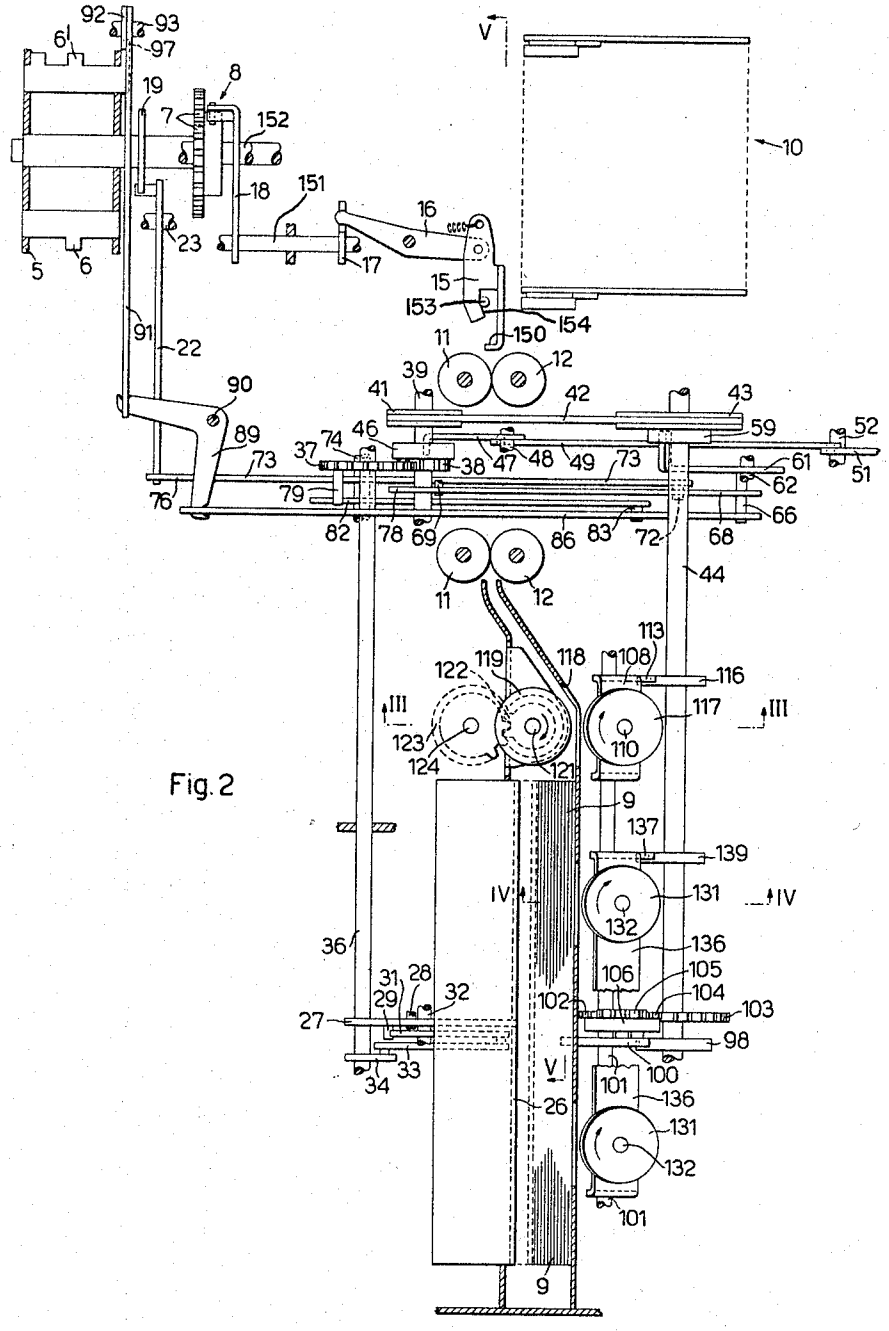

Fig. 2

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Filed Oct. 3, 1966 3 Sheets-Sheet 3

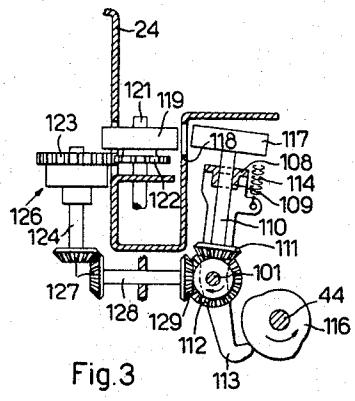

Fig. 3

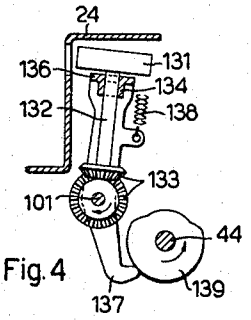

Fig. 4

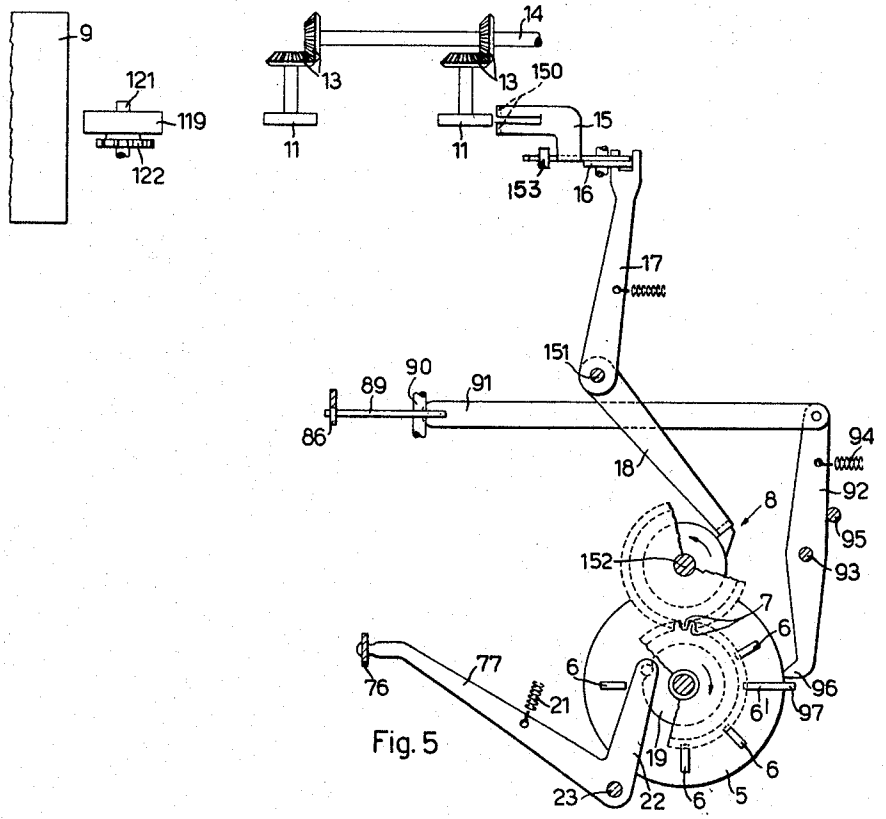

Fig. 5

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United States Patent Office 3,381,955 Patented May 7, 1968

3,381,955

AUTOMATIC DOCUMENT FEEDING DEVICE FOR A PRINTING MECHANISM OF AN ADDING OR ACCOUNTING MACHINE

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Claims priority, application Italy, Oct. 9, 1965, 22,711/65
5 Claims. (Cl. 271—4)

ABSTRACT OF THE DISCLOSURE

An automatic document feeding device for an accounting machine controlled by a program control device to print each document in a sequence of printing operations, comprises a clutch for moving the program support through a set of stations. Each document is fed from a stack by the operation of a main operating mechanism and upon encountering a shiftable member causes said clutch to be engaged, said support being adapted to cause the operation of said mechanism to feed the next document. The first document is fed by said mechanism upon operating a starting key.

This invention relates to an automatic document feeding device for a printing mechanism of an adding or accounting machine adapted to print each document in a sequence of printing operations controlled by a program control device comprising a support intermittently movable through a set of stations, each one associated with one of said operations.

In a known printing adding machine of the above mentioned type, the documents are individually fed by inserting each document manually into a suitable slot, whereby the printing operation requires a long time and the constant attention of the operator.

These disadvantages are obviated by the automatic document feeding device according to the invention, which comprises a container for a stack of documents to be fed, each document when so fed being adapted to cause a first cyclically operating mechanism to move said support sequentially through said set of stations, and is characterized in that the documents of said stack are individually fed to said printing mechanism by a second cyclically operating mechanism adapted to be conditioned for operation by a shiftable member controlled by said support upon being moved a predetermined extent.

This and other characteristics of the invention will become apparent from the following description of a preferred embodiment, and from the accompanying drawings, wherein:

FIG. 1 is a left hand partial longitudinal sectional view of a printing adding machine incorporating an automatic document feeding device according to the invention;

FIG. 2 is a partial plan view of the machine of FIG. 1;

FIG. 3 is a partial sectional view taken according to the line III—III of FIG. 2;

FIG. 4 is a partial sectional view taken according to the line IV—IV of FIG. 2;

FIG. 5 is a partial frontal sectional view taken according to the line V—V of FIG. 2.

The automatic document feeding device is incorporated in a printing adding machine adapted to print documents, for example bank checks **9** to be then handled by automatic character recognizing apparatus. Each check is printed in a sequence of printing operations controlled by a program control device comprising a support or

drum **5** (FIG. 5) provided with a set of of function controlling plates **6**. The drum **5** is adapted to be rotated clockwise by a first cyclically operating mechanism comprising a pair of toothed wheels **7**. These wheels **7** are adapted to be rotated one revolution upon engaging a one cycle clutch **8**, in the manner described in the U.S. Patent Application Ser. No. 445,656, now Patent No. 3,318,520, which will be here shortly described.

Each check **9** is fed from left to right (upwards in FIG. 2) to be located in front of a printing mechanism, generically identified by the numeral **10**, by means of a set of rollers **11** cooperating with a set of counter-rollers **12**. Each roller **11** is rotated by a pair of bevel gears **13** (FIG. 5) operated by a continuously rotating shaft **14**. The check **9**, upon engaging a pair of lugs **150** of a slide **15**, rocks displaces the slide **15** rightwards thus rocking a lever **16** (FIG. 2) counterclockwise. The slide **15** (FIG. 2), upon being so displaced, is slightly rocked counterclockwise by the cooperation of a stationary pin **153** with a cam edge **154** of the slide **15**. Therefore the lugs **150** are brought out of the path of the check **9**, which is thus released and can be fed by the rollers **11** and **12**. The lever **16** in turn rocks an arm **17** (FIG. 5) clockwise, concomitantly with a second arm **18** secured thereto through a shaft **151** rotatably mounted on the machine frame.

Therefore the arm **18** causes the engagement of the clutch **8**, which is operated by a shaft **152** through a friction joint not shown in the drawings, in order to enable the drum **5** to be arrested through the plates **6** in a set of stations. In each station the plate **6** controls a printing machine operation in a known manner. A cam **19** integral with the drum **5** cooperates with a locking lever **22** urged by a spring **21** and fulcrumed on a stationary pivot **23** to normally hold the drum **5** at rest.

The automatic feeding device comprises a container **24** (FIGS. 1 and 2) adapted to contain a stack of checks **9**, and a plate **26** located in the container **24** and adapted to press the checks **9**. To this end the plate **26** is secured to a slide **27** (FIG. 1) slidably mounted on a stationary pin **28** and provided with a pin **29** normally urged by a spring **30** to contact a lever **31** fulcrumed at **32**. The lever **31** is linked through a link **33** with a crank lever **34** secured to a shaft **36** rotatably mounted on the machine frame. Furthermore, secured to the shaft **36** is a toothed wheel **37** meshing with a pinion **38** having a diameter half the diameter of the wheel **37**. The pinion **38** is rotatably mounted on a shaft **39** continuously rotated counterclockwise by a conventional electric motor not shown in the drawings. Secured to the shaft **39** is a pulley **41** connected through a belt **42** with a second pulley **43** rotatably mounted on another shaft **44** comprised in a second cyclically operating mechanism.

The pinion **38** is adapted to be connected with the shaft **39** for one revolution by means of a one cycle clutch, generically identified by the numeral **46**, and normally held disengaged by a lever **47** fulcrumed on a stationary pivot **48**. The lever **47** is connected through a link **49** with a lever **51** fulcrumed on a stationary pivot **52** and normally urged by a spring **53** to contact a stationary stop **54**. The lever **51** is provided with a projection **55** adapted to be engaged by a pin **56** of the stem of a motor key **57**, which upon being depressed controls in a known manner a printing cycle of the main shaft of the adding machine, not shown in the drawings.

The shaft **44** represents the main shaft of the automatic feeding device, and is adapted to be connected with the pulley **43** for one revolution, by means of another one cycle clutch **59** normally held disengaged by a shifting member or lever **61**. This latter is fulcrumed on a stationpary pin **62** and is normally urged by a spring **63** to con-

tact a stationary stop **64**. Furthermore, the lever **61** is provided with a pin **66** normally cooperating with a shoulder **67** of a first element or slide **68** slidably mounted on a stationary pin **69**. The slide **68** is normally urged by a spring **71** to contact longitudinally the pin **69**, and vertically a pin **72** of a lever **73** fulcrumed on a stationary shaft **74**. The lever **73** is provided with a forked end **76** engaging an arm **77** of the lever **22** (FIG. 5). Finally, the slide **68** is provided with a projection **78** (FIG. 1) adapted to be engaged by a pin **79** secured to the toothed wheel **37** and shown by continuous lines in FIG. 1.

A second element or slide **86** is provided with a shoulder **87** adapted to cooperate with the pin **66** of the lever **61** but normally located over this pin. The slide **86** is linked with a horizontal lever **89** and is normally urged by a spring **84** to contact a pin **83** of a lever **82** pivoted on the shaft **74**. The lever **82** is urged by a spring **81** to contact the pin **79** of the toothed wheel **37**. In turn the lever **89** (FIG. 2) is pivoted at **90** and is linked with a transverse slide **91**. The slide **91** is linked with a lever **92** (FIG. 5) fulcrumed at **93** and normally urged by a spring **94** to contact a stationary stop **95**. A projection **96** of the lever **92** is adapted to be engaged by a projection **97** provided on a predetermined plate **6'** of the drum **5**.

Secured to the main shaft **44** (FIG. 1) is a cam **98** normally contacted by a lever **100** fulcrumed on a shaft **101** and urged counterclockwise by a spring **99**. The shaft **101** is rotatably mounted on the machine frame and is secured to a pinion **102** constantly meshing with a toothed wheel **103** secured to the shaft **44**. Furthermore, fulcrumed on the lever **100** are two intermeshing pinions **104** and **105**, the pinion **104** meshing also with the pinion **102**, the pinion **105** being secured to an aligning roller **106**. This latter is adapted to cooperate with the checks **9** through a window **107** of the container **24**, but it is normally held distanced apart from the checks **9** by the cam **98**.

Rotatably mounted on the shaft **101** is a bail **108** (FIG. 3) having a transverse portion integral with a collar **109**, rotatably mounting a shaft **110**. Secured to the shaft **110** is a bevel gear **111** meshing with another bevel gear **112** secured to the shaft **101**. Furthermore, the bail **108** is provided with an arm **113** normally urged by a spring **114** to contact a second cam **116** of the shaft **44**. Secured to the shaft **110** is also a roller **117** adapted to cooperate through a window **118** of the container **24** with a second roller **119**, but normally held by the cam **116** distanced apart therefrom.

The roller **119** is rotatably mounted on a pivot **121** of the container **124** and is integral with a pinion **122** meshing with a toothed wheel **123** connected with a vertical shaft **124** by means of a friction joint generically indicated by the numeral **126**. The shaft **124** is connected by a pair of bevel gears **127** with a shaft **128**, secured to another bevel gear **129** meshing with the bevel gear **112**.

Finally, the automatic feeding device is provided with a pair of rollers **131** (FIGS. 2 and 4), each one secured to a vertical shaft **132** adapted to be rotated by the shaft **101** through a correponding pair of bevel gears **133**. The shafts **132** are rotatably mounted into a pair of collars **134** secured to a bail **136**. The latter is fulcrumed on the shaft **101** and is provided with an arm **137** normally urged by a spring **138** to contact another cam **139** of the main shaft **44**.

The automatic feeding device operates as follows:

Normally the plate **26** is in the ineffective position of FIG. 1. After having loaded the container **24** with a stack of checks **9**, and the key **57** is depressed, the pin **56** engages the projection **55** and rocks the lever **51** clockwise. The link **49** now rocks the lever **47** counterclockwise thus engaging the clutch **46** to connect the shaft **39** with the pinion **38** for one revolution counterclockwise.

Now the pinion **38** rotates the wheel **37** half a revolution clockwise, together with the shaft **36** and the crank

lever **34**. This lever through the link **33** rocks the lever **31** clockwise thus releasing the pin **29** of the slide **27**. Now the spring **30** urges the plate **26** to press the checks **9** against the fore side of the container **24**, whereby the feeding device is ready to feed the checks **9**.

In turn the pin **79** of the wheel **37** releases the lever **82**, which is rocked clockwise by the spring **81**, thus causing the spring **84** to lower the slide **86** and to locate the shoulder **87** in effective position for engaging the pin **66** of the lever **61**. Near the end of the cycle of the wheel **38**, the pin **79** of the wheel **37** engages the projection **78** and displaces the slide **68** forwards. Then the shoulder **67** of the slide **68** engages the pin **66** and rocks the lever **61** counterclockwise thus causing the clutch **59** to be enagaged for one cycle of the main shaft **44**. The pin **79** reaches then the position indicated by broken lines in FIG. 1, whereby the slide **68** is returned rearwards by the spring **71**.

The shaft **44** through the toothed wheel **103** rotates now the pinion **102** clockwise together with the shaft **101**. Then the pinion **102** through the pinion **104** rotates the pinion **105** and the aligning roller **106** clockwise. Furthermore the shaft **101**, through the bevel gears **112**, **111** (FIG. 3) and **133** (FIG. 4), rotates the roller **117** (FIG. 2) and the two rollers **131** clockwise. Finally the shaft **101** (FIG. 3), through the bevel gears **112**, **129** and **127**, the friction joint **126** and the toothed wheel **123**, rotates the pinion **12** (FIG. 2) and the roller **119** also clockwise.

At the beginning of the cycle of the shaft **44**, the cam **98** (FIG. 1) causes the spring **99** to rock the lever **100** counterclockwise, whereby the aligning roller **106** is brought to the position shown by broken lines in FIG. 1 to contact the first check **9** of the stack to be fed. Now the roller **106** pushes the first check **9** downwards to align it exactly on the lower side of the container **24**.

Thereafter the cam **98** returns the roller **106** to the position of FIG. 1, while the cam **116** (FIG. 3) causes the spring **114** to rotate the bail **108** counterclockwise, whereby the rollers **117** contacts the roller **119**. Simultaneously the cam **139** (FIG. 4) causes the spring **138** to rotate the bail **136** counterclockwise, whereby the rollers **131** (FIG. 2) engage the first check **9** of the stack. Then the rollers **131** (FIG. 2) push this check **9** between the rollers **117** and **119**, which being rotated in the same direction prevent more than one check **9** at a time from being fed.

The first check is thus brought between the rollers **11** and **12**. Now the cam **139** removes the rollers **131** from the checks and thereafter the cam **116** removes the roller **117** from the roller **119**. The rollers **11** and **12** push the fed check **9** against the lugs **150** of the slide **15**, thus engaging the clutch **8** of the drum **5** in the manner above described.

As soon as the drum **5** leaves the rest position shown in FIG. 5, the cam **19** rocks the lever **22** counterclockwise. In turn the lever **22** rocks the lever **73** (FIG. 1) counterclockwise, whereby the pin **72** raises the slide **68**, thus bringing the shoulder **67** into a position ineffective for engaging the pin **66**. Therefore, when the drum **5** is out of the rest position, the action of the pin **79** has no effect on the lever **61**. This action may happen in the case the key **57** is depressed twice during the cycle of the drum **5**.

Near the end of the cycle of the drum **5** (FIG. 5), the projection **97** of the plate **6'** engages the projection **96** of the lever **92**, which is thus rocked counterclockwise. Then the lever **92**, through the slide **91** and the lever **89**, pushes the slide **86** (FIG. 1) forwards. Now the shoulder **87** engages the pin **66** and rocks the lever **61** counterclockwise, thus causing the clutch **59** to be engaged for a new feeding cycle of the shaft **44**.

It is thus clear that the checks **9** of the stack are individually fed to the printing mechanism **10** by a second cyclically operating mechanism **44** adapted to be con-

ditioned for operation by a shiftable member **61** controlled by the program drum **5** upon being moved a predetermined extent.

When the feeding device is to be stopped the key **57** is again depressed and, through the lever **51**, the link **49** and the lever **47**, causes the clutch **46** to effect another cycle of the pinion **38**. Now the pinion **38** rotates the wheel **37** another half a revolution together with the shaft **36** and the crank lever **34**. This latter through the link **33** and the lever **31** restores the slide **27** together with the plate **26** to the position of FIG. 1.

Simultaneously, the pin **79** of the wheel **37** is moved from the position shown by broken lines in FIG. 1 to the position shown by solid lines, thus returning the lever **82** counterclockwise. Then the pin **83** returns the slide **86** to the ineffective position shown in FIG. 1. Therefore, at the end of the cycle of the drum **5**, when the slide **86** is moved forwards, the shoulder **87** does not engage the pin **66**, and the clutch **59** is not engaged, whereby the feeding device is stopped.

It is intended that many changes, improvements and additions of parts may be made to the described automatic feeding device, without departing from the scope of the invention as defined by the appended claims.

What we claim is:

1. In an adding or accounting machine having a printing mechanism adapted to print each document in a sequence of printing operations controlled by a program control device comprising a support intermittently movable through a set of stations, each one associated with one of said operations, an automatic document feeding device, comprising in combination:

(a) a container for a stack of documents to be fed,
(b) a first cyclically operating mechanism for moving said support sequentially through said set of stations,
(c) a second cyclically operating mechanism for individually feeding the documents of said stack to said printing mechanism,
(d) means engageable by each document when so fed for conditioning said first mechanism for operation,
(e) a control member on said support,
(f) a shiftable member for conditioning said second mechanism for operation,
(g) and intermediate means engageable by said control member when said support has been moved a predetermined extent for shifting said shiftable member.

2. In an adding or accounting machine having a printing mechanism adapted to print each document in a sequence of printing operations controlled by a program control device comprising a support intermittently movable through a set of stations, each one associated with one of said operations, an automatic document feeding device, comprising in combination:

(a) a container for a stack of documents to be fed,
(b) a first cyclically operating mechanism for moving said support sequentially through said set of stations,
(c) a second cyclically operating mechanism for individually feeding the documents of said stack to said printing mechanism,
(d) means operated by each document when so fed for conditioning said first mechanism for operation,
(e) a shiftable member for conditioning said second mechanism for operation,
(f) a normally ineffective plate for pressing the documents of said stack to enable said documents to be automatically fed,
(g) an operable manual member,
(h) means effective upon operation of said manual member for rendering said plate effective and for shifting said shiftable member,
(i) a control member on said support,
(j) and intermediate means engageable by said control member when said support has been moved a predetermined extent for shifting said shiftable member.

3. In an adding or accounting machine having a printing mechanism adapted to print each document in a sequence of printing operations controlled by a program control device comprising a support intermittently movable through a set of stations, each one associated with one of said operations, an automatic feeding device, comprising in combination:

(a) a container for a stack of documents to be fed,
(b) a first cyclically operating for moving said support sequentially through said set of stations,
(c) a second cyclically operating mechanism for individually feeding the documents of said stack to said printing mechanism,
(d) means engageable by each document when so fed for conditioning said first mechanism for operation,
(e) a control member on said support,
(f) a shiftable member for conditioning said second mechanism for operation,
(g) a manually operable member,
(h) a first element operable for shifting said shiftable member in response to alternate operations of said manually operable member,
(i) a normally ineffective second element operable by said control member when said support is moved a predetermined extent for shifting said shiftable member,
(j) and means drivable in response to the alternate operations of said manually operable member for rendering said second element temporarily effective.

4. In an adding or accounting machine having a printing mechanism adapted to print each document in a sequence of printing operations controlled by a program control device comprising a support intermittently movable through a set of stations, each one associated with one of said operations, an automatic document feeding device, comprising in combination:

(a) a container for a stack of documents to be fed,
(b) a first cyclically operating mechanism for moving said support sequentially through said set of stations,
(c) a first one cycle clutch adapted to be engaged for operating said first mechanism,
(d) a second cyclically operating mechanism for individually feeding the documents of said stack from said container to said printing device,
(e) a second one cycle clutch adapted to be engaged for operating said second mechanism,
(f) a normally ineffective plate for pressing the documents of said stack to enable said documents to be automatically fed upon operation of said second mechanism,
(g) means operated by each document when so fed for engaging said first clutch,
(h) a third one cycle clutch,
(i) a shaft adapted to be cyclically rotated by said third clutch half a revolution,
(j) a key depressible for engaging said third clutch,
(k) a member shiftable for engaging said second clutch,
(l) a first element operable for shifting said shiftable member,
(m) a control member on said support,
(n) a normally ineffective second element operable by said control member when said support is moved a predetermined extent for shifting said shiftable member,
(o) means drivable for rendering said second element temporarily effective,
(p) and means secured to said shaft for operating said first element for rendering said plate effective and for driving said drivable means at alternate cycles of said shaft.

5. In an adding or accounting machine according to claim 4, the combination comprising:

(q) a cam secured to said support,

(r) and means operable by said cam for rendering said first element ineffective when said second clutch is engaged.

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