May 20, 1969 B. FRANCISCO 3,444,979

RIBBON FEEDING DEVICE FOR A VARIABLE SPACING TYPEWRITER

Filed June 2, 1966 Sheet 1 of 2

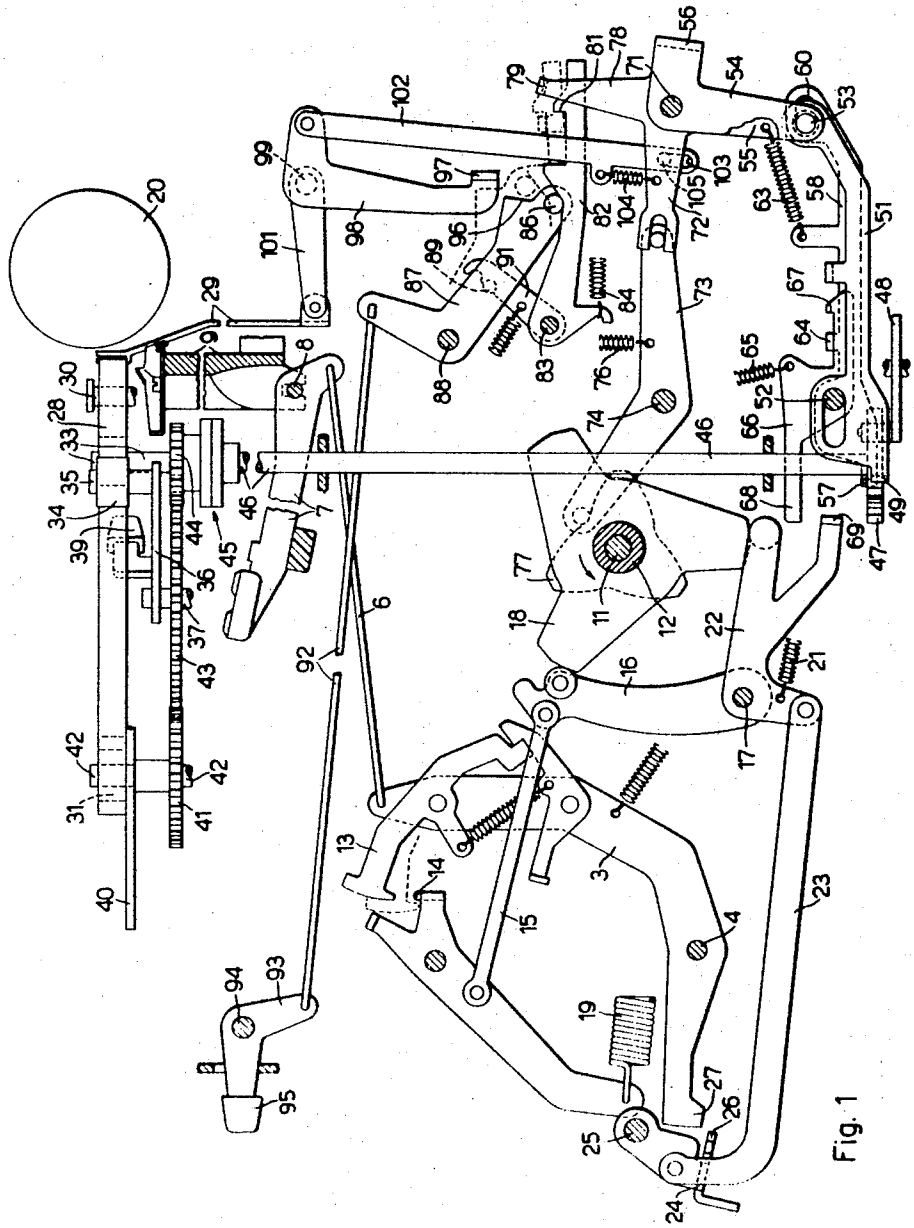

Fig. 1

INVENTOR.
BERNARDINO FRANCISCO

BY John Toggenburger
AGENT

RIBBON FEEDING DEVICE FOR A VARIABLE SPACING TYPEWRITER

Filed June 2, 1966 Sheet 2 of 2

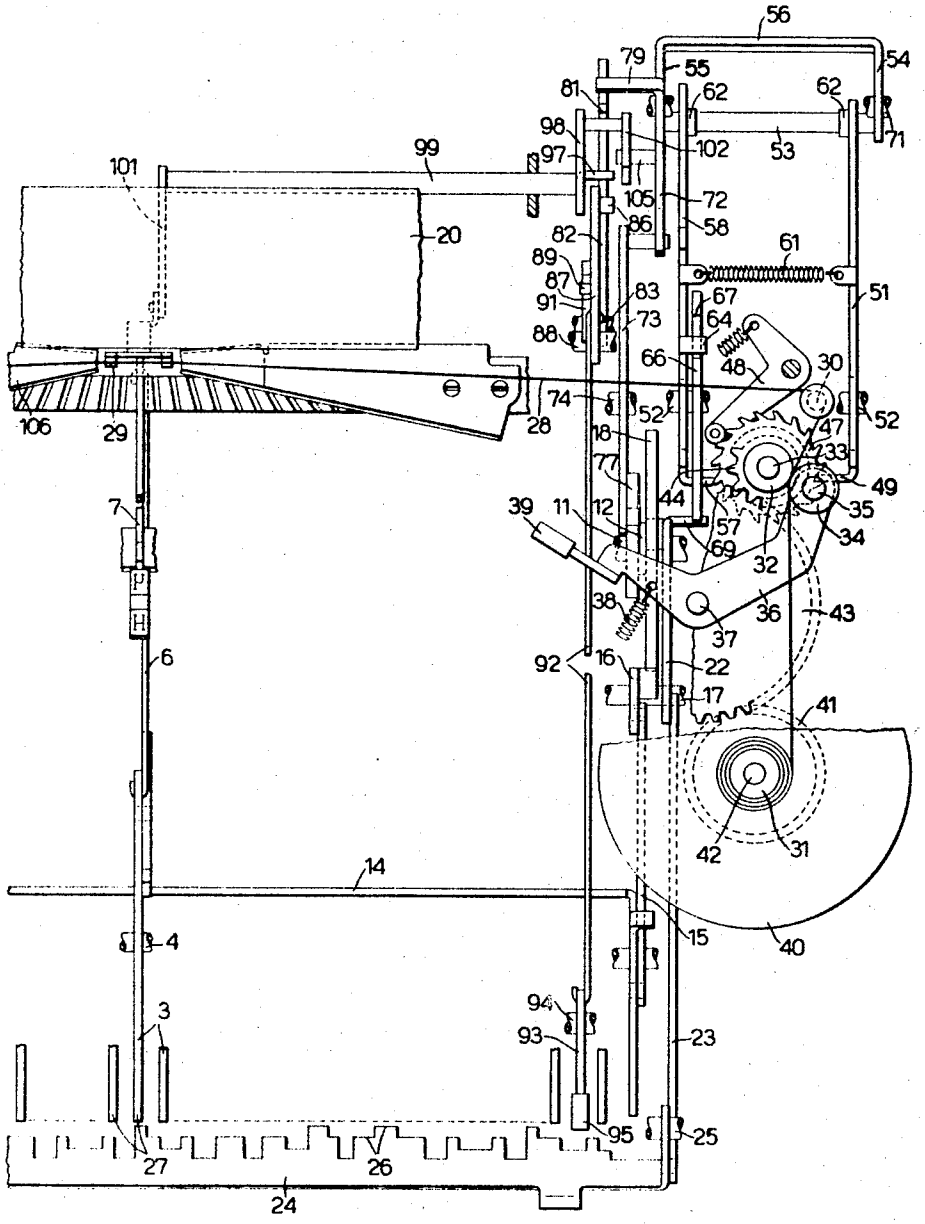

Fig. 2

INVENTOR.
BERNARDINO FRANCISCO
BY John Toggenburger
AGENT

United States Patent Office 3,444,979 Patented May 20, 1969

3,444,979

RIBBON FEEDING DEVICE FOR A VARIABLE SPACING TYPEWRITER

Bernardino Francisco, Fiorano, Turin, Italy, assignor to Ing. C. Olivetti & C.S.p.A., Ivrea, Italy, a corporation of Italy

Filed June 2, 1966, Ser. No. 554,767
Claims priority, application Italy, June 9, 1965, 13,124/65
Int. Cl. B41j 33/18
U.S. Cl. 197—151 3 Claims

ABSTRACT OF THE DISCLOSURE

A variable spacing typewriter is provided with a carbon ribbon feeding device adapted to advance the ribbon a minor length when a first group of types is printed and a major length when a second group of types is printed. The ribbon is advanced through a ratchet wheel cooperating with a pair of parallel pawls, which are reciprocated upon printing each type, whereby a first pawl advances the ribbon a first increment during the forward stroke of the pawls, whereas the other pawl advances the ribbon a second increment during the return stroke thereof. A spacing selector is adapted to disable said other pawl upon selecting the spacing of any type of said first group.

This invention relates to a ribbon feeding device for a variable spacing typewriter, comprising means normally effective for feeding a predeterminate portion of ribbon in the printing advancing direction upon printing each character.

In the variable spacing typewriters, particularly in the case wherein carbon ribbon is used, it is useful to feed the ribbon through variable strokes according to the width of the printed character. There are known differential ribbon feeding devices, wherein the ribbon is fed proportionally to the carriage spacing corresponding to each printed character. These devices are intricate and expensive since the carriage generally may advance through a variable number of unit spacings from two to six, whereby the ribbon feeding device needs to advance the ribbon through one of five different lengths.

To obviate this disadvantage, a feeding device has been proposed, wherein a member for feeding the ribbon is predisposed before the printing for effecting two different strokes corresponding to two different ribbon portions. Therefore, after the printing a time corresponding to the longer stroke must be provided for feeding the ribbon, whereby the speed of the machine is reduced.

A ribbon feeding device is also known which comprises a ratchet wheel and a pair of simultaneously reciprocating pawls to rotate the wheel. However, this device is unable to variably advance the ribbon relatedly to the spacing effected by the carriage.

The primary object of the invention is to provide in a proportionally spacing typewriter an efficient ribbon feeding device which substantially avoids waste of carbon ribbon.

Another object of the invention is to provide for a proportionally spacing typewriter a ribbon feeding device which is inexpensive to manufacture, reliable in operation and feeds the ribbon efficiently through extents correlated to the characters being typed.

The invention is applied to a variable spacing typewriter which includes a usual set of types, a set of intermediate operating members for said types, and a spacing control mechanism governed by the said intermediate members to execute incidental to each typing operation a variable, proportional space regulating movement correlated to the particular type that is being operated. If the

variable space requirement for the character being typed is greater than a certain size, the staetd control mechanism will execute an appropriate stroke transgressing a certain extent of operation. On the other hand if the variable space requirement for the character being typed is below said certain size, the stated control mechanism will execute an appropriate stroke short of transgressing said certain extent of operation. On the other hand if the variable space requirement for the character being typed is below said certain size, the stated control mechanism will execute a stroke short of transgressing said certain extent of operation.

A carbon ribbon feeding device is governed by said control mechanism so that if the latter executes a stroke transgressing said certain extent of operation, a ratchet wheel of a ribbon feeding device, through the medium of a first pawl, will receive a ribbon feeding motion from a power operable means during a forward stroke thereof, and further, through the medium of another pawl will receive a supplemental ribbon feeding motion from the power operable means during a return stroke thereof. On the other hand, if said control mechanism executes a stroke short of transgressing said certain extent of operation, the said ratchet wheel will receive a ribbon feeding motion from the power operable means only during the forward stroke of the power operable means, the said other pawl being held in a disabled condition due to the control mechanism having moved short of transgressing said certain point of operation.

Specifically said first and said other pawl are arranged for feeding cooperation with said ratchet wheel at two diametrically opposite sides thereof. Furthermore, said first pawl and the other pawl are adapted to feed said ratchet wheel respectively during the forward and the return stroke of said power operable means.

However, in any typing operations in which said stated control mechanism does not transgress said certain extent of operation, the said second pawl is held disabled so that no supplemental ribbon feeding operation will materialize.

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

FIG. 1 is a right hand partial longitudinal sectional view of a variable spacing typewriter incorporating a ribbon feeding device according to the invention; and

FIG. 2 is a partial plan view of the typewriter of FIG. 1.

With reference to FIG. 1, the variable spacing typewriter comprises a set of type actions, each one having an intermediate lever **3** fulcrumed on a stationary shaft **4** and connected through a link **6** to a type bar **7**. This latter is fulcrumed on a wire rod **8** carried by a conventional basket **9**. Furthermore the typewriter comprises a shaft **11** continuously rotated counterclockwise by an electric motor not shown in the drawing. A sleeve **12** is adapted to be cyclically rotated 120 degrees by the shaft **11** at the depression of each printing key in the manner described in the United States Letters Patent No. 3,151,722. A pawl **13** fulcrumed on the corresponding intermediate lever **3** engages then a universal bar **14**, which through a link **15** is connected to a lever **16** fulcrumed on a stationary pivot **17** and cooperating with a cam **18** secured to the sleeve **12**. Then the cam **18** releases the lever **16**, thus causing a spring **19** to rock the bar **14** counterclockwise, whereby the lever **3** is rocked also counterclockwise and causes the type bar **7** to strike against the conventional platen **20**.

Furthermore, the typewriter is provided with a variable spacing control mechanism comprising a lever **22** fulcrumed on the pivot **17** and urged by a spring **21** to contact cam **18**. The lever **32** is connected through a link **23** to a universal bar **24** fulcrumed at **25** and adapted to

predispose a spacing corresponding to the character to be printed in the manner described in the United States Letters Patent No. 3,288,262, wherein the bar **24** is indicated by the numeral **183**. To this end the universal bar **24** is provided with a set of teeth **26** (FIG. 2) having a variable length and each one adapted to sense a projection **27** (FIG. 1) of the intermediate lever **3** of the corresponding type action when operated. The universal bar **24** when rocked counterclockwise may be arrested at four different positions to correspondingly select a spacing variable from two to five unit spacings. Therefore the stroke of the universal bar **24** is substantially proportional to the spacing effected by the carriage. It is to be pointed out that the conventional space bar, not shown in the drawing, does not cause a cycle of the sleeve **12**, but it operates the escapement mechanism independently from the universal bar **24**.

The typewriter is provided with a device for feeding a carbon ribbon **28** in front of the platen **20**. The ribbon **28** (FIG. 2) is supplied by a spool not shown in the drawing and is fed in the printing advancing direction, that is from left to right through a conventional ribbon vibrator **29**. This latter is fulcrumed on an arm **101** secured to a shaft **99** rotatably mounted on the machine frame. The ribbon **28** is then guided by a roller **30** and is finally wound on a winding spool **31**. The ribbon feeding device comprises a pair of friction rollers **32, 34** of which the roller **32** is secured to a vertical pivot **33**, whereas the roller **34** is rotatably mounted on a pin **35** carried by a lever **36**. This latter is fulcrumed on a stationary pivot **37** and is urged counterclockwise by a spring **38**. The lever **36** is also provided with a projection **39** manually operable from the top of the machine, for inserting a fresh ribbon between the rollers **32, 34**.

The spool **31** is frictionally driven by a flange **40** secured to a gear **41** rotatably mounted on a stationary shaft **42**. The gear **41** meshes with a second gear **43** rotatably mounted on the pivot **37** and meshing with a third gear **44** secured to the pivot **33**. This latter is connected through a pair of friction disks, generically indicated by the numeral **45** (FIG. 1), to a vertical shaft **46** rotatably mounted on the machine frame. Secured to the lower end of the shaft **46** is a ratchet wheel **47** cooperating with a spring urged locking member **48** (FIG. 2).

The feeding device is provided with normally effective first means comprising a first pawl cooperating with ratchet wheel **47** and formed of a lug **49** of a slide **51** slidably mounted on a stationary shaft **52** (FIG. 1). The feeding device is also provided with normally ineffective second means comprising a second pawl cooperating with the ratchet wheel **47** at the diametrically opposite side with respect to the lug **49** and formed of a lug **57** (FIG. 2) of a second slide **58** slidably mounted on the shaft **52** (FIG. 1).

The two slides **51** and **58** are simultaneously reciprocated by a common member or bar **53** through a forward and a return stroke, the forward stroke being effected susbtantially before the printing, the return stroke being effected after the printing. Therefore, the lug **57** is adapted to rotate the ratchet wheel **47** before the printing, and the lug **49** is adapted to rotate the wheel **47** after the printing. More particularly, the slide **51** is rotatable on the bar **53** and axially shiftable thereon, whereas the slide **58** is provided with a slot **60** engaging the bar **53** so as to enable the bar **53** to be rearwards (rightwards in FIG. 1) moved with respect to the slide **58**, and this latter to be rotated and axially shifted on the bar **53**. A spring **61** (FIG. 2) tensioned between the slides **51** and **58** urges said slides to contact two flanges **62** of the bar **53**, and the lugs **49** and **57** to engage the ratchet wheel **47**. The bar **53** is secured to a pair of arms **55** and **54** of a bail **56** fulcrumed on a stationary shaft **71**.

Yieldable connecting means are provided between the bar **53** and the slide **58**. Particularly said connecting means comprise a spring **63** (FIG. 1) tensioned between the arm **55** of the bail **56** and the slide **58**. This latter is also provided with a lug **64** contacted by a lever **66** fulcrumed on the shaft **52**, under the urge of a spring **65**. The lever **66** is provided with an element or shoulder **67** normally located in the path of the lug **64**. Finally, the lever **66** is provided with a projection **68** adapted to be engaged by a lug **69** of the lever **22** when the universal bar **24** is rocked for predisposing at least five unit spacings.

Furthermore, the bail **56** is provided with a third arm **72** pin and slot connected with a lever **73** fulcrumed at **74** and normally urged by a spring **76** to contact a cam **77** of the sleeve **12**. A further arm **78** of the bail **56** is provided with a lug **79** adapted to cooperate with a shoulder **81** of a lever **82** fulcrumed at **83**. The lever **82** is normally urged by a spring **84** to contact a pin **86** of a lever **87** fulcrumed at **88** and provided with a pin **89** cooperating with a spring urged locking member **91**. The lever **87** is connected through a link **92** to a lever **93** fulcrumed at **94** and having a manually operable projection **95**. Finally, the lever **87** is provided with a shoulder **96** adapted to cooperate with a lug **97** of a lever **98** secured to the shaft **99** (FIG. 2). The lever **98** is linked with a link **102** provided with a slot **103** normally urged by a spring **104** to contact a pin **105** of the arm **72** of the bail **56**.

The ribbon feeding device operates as follows.

During each cycle of the sleeve **12**, the cam **77**, through the lever **73**, rocks the bail **56** at first counterclockwise and then clockwise. Assuming that the lever **93** is located in the position of FIG. 1, the spring **104** moves the link **102** downwards, and rocks the lever **98** clockwise together with the shaft **99** and the arm **101**. The vibrator **29** is thus displaced upwards so as to insert the ribbon **28** between the type bar **7** and the platen **20**. Furthermore, the bar **53** of the bail **56** is displaced at first rearwards (rightwards in FIG. 1) and then forwards, a stroke corresponding to two steps of the ratchet wheel **47** (FIG. 2).

In the case the universal bar **24** is arrested by the projection **27** of the operated type action in a position corresponding to a number of unit spacings from two to four, the lug **69** (FIG. 1) of the lever **22** does not engage the projection **68** of the lever **66**. Then the shoulder **67** of the lever **66** arrests the slide **58** after such a stroke as to cause its lug **57** (FIG. 2) to advance the ratchet wheel **47** about half a step before the printing is effected. On the contrary, the slide **51** is positively drawn rearwards by the bar **53** about two steps of the ratchet wheel **47**, whereby the lug **49** engages the second tooth starting from the one engaged at the beginning of the cycle.

After the printing, the cam **77** (FIG. 1) causes the spring **76** to return the lever **73** counterclockwise and the bail **56** clockwise. Then the pin **105**, through the link **102**, the lever **98** and the arm **101**, restores the vibrator **29** downwards, while the bar **53** restores the slides **51** and **58** forwards. Now the lug **49** (FIG. 2) of the slide **51** rotates the ratchet wheel **47** clockwise one step and a half, whereby the ratchet wheel **47** in the whole is rotated two steps, corresponding to a predetermined portion of ribbon **28**.

On the contrary, in the case the universal bar **24** is arrested in a position corresponding at least to five unit spacings, the lug **69** (FIG. 1) engages the projection **68** of the lever **66** which is rocked clockwise and removes its shoulder **67** out of the path of the lug **64**.

Now, when the bail **56** is rotated counterclockwise, the slide **58** is no longer arrested and the lug **57** (FIG. 2) previously advances the ratchet wheel **47** one step and a half before the printing, while the lug **49** engages the third tooth starting from the one engaged at the beginning of the printing cycle. After the printing, the lug **49** is returned forwards and advances the ratchet wheel **47** one step and a half as in the preceding case, whereby in the whole the ratchet wheel **47** is rotated three steps instead of two steps, thus advancing an additional portion of the ribbon **28**.

It is thus clear that, neglecting the half a step advancement caused in any case by the lug **57** to make sure the engagement of the lug **49** between two teeth of the ratchet wheel **47**, the pawl **49, 51** is normally effective for feeding a predeterminate portion of ribbon in the printing advancing direction upon printing each character, whereas the pawl **57, 58** is normally ineffective for previously feeding an additional portion of ribbon, and is rendered effective by the means **22, 69** when a character requiring at least a predetermined spacing is conditioned for printing. Since the ribbon is advanced from left to right the additional portion previously fed predisposes at left a sufficient length of fresh ribbon for printing the widest characters.

If the ribbon **28** is to be prevented from being fed, for example, for cutting a stencil, the lever **93** (FIG. 1) must be rocked clockwise. Then the lever **93** through the link **92** rocks the lever **87** counterclockwise, to the position shown by broken lines in FIG. 1. The shoulder **96** of the lever **87** is thus brought into the path of the lug **97**, while the pin **86** causes the lever **82** to temporarily contact the lug **79**.

Thereafter, upon printing the first character, the cam **77** rocks the bail **56** counterclockwise, but the vibrator **29** is not raised because the lug **97** is arrested by the shoulder **96** of the lever **87**. On the contrary, the lug **79** of the bail **56** is brought in front of the shoulder **81** and is locked by this latter in the position shown by broken lines in the FIG. 1. Therefore, the bail **56** is prevented from being restored clockwise and the ribbon feeding device rendered ineffective in the first, as well as in the following printing cycles, until the lever **93** will be returned to the position of FIG. 1.

What I claim is:

1. In a variable spacing typewriter having a cyclically operating mechanism, a set of types, a set of intermediate members associated with said types and individually movable from a rest position to an operated position to condition the associated type for printing, and a spacing control mechanism comprising a universal member controlled by said cyclically operating mechanism for sensing the intermediate member so moved, said universal member being arrested by the various intermediate members upon being moved through different extents for causing a letter spacing proportional to said extent, a carbon ribbon feeding device for feeding a carbon ribbon through a printing point, comprising in combination:

(a) a pair of friction rollers for feeding said ribbon in an advancing direction,

(b) a ratchet wheel connected to one of said rollers,

(c) a pair of parallel pawls cooperating with said ratchet wheel at two diametrically opposite sides thereof,

(d) a bar mounting said pair of parallel pawls,

(e) means operated by said cyclically operating mechanism for reciprocating said bar through a forward stroke and a return stroke,

(f) resilient means connecting said bar to a first one of said pair of parallel pawls for rotating said ratchet wheel a first increment during said forward stroke, the other pawl being effective to rotate said ratchet wheel a second increment during said return stroke,

(g) a removable stop element normally located on the path of the forward stroke of said first pawl,

(h) and a member connected to said universal member for removing said element from said path when said universal member has been moved at least through a predetermined one of said extents.

2. A ribbon feeding device according to claim **1**, wherein said pawls are formed of a pair of slides at two opposite sides of said ratchet wheel, said bar being parallel to said ratchet wheel, said pair of slides being pivotable and axially shiftable on said bar, a pair of lugs being integral with said pair of slides and directed in opposite directions for cooperating with said ratchet wheel at two diametrically opposite sides thereof, said ribbon feeding device further comprising in combination:

(i) a spring urging said pair of slides axially toward each other,

(j) and a slot on one of said pair of slides and engaging said bar for enabling said first slide to be moved perpendicular to said bar.

3. In a variable spacing typewriter having a set of types, a set of intermediate members associated with said types and individually operable to condition the associated type for printing, and a spacing control mechanism cooperating with the so operated intermediate member for causing a letter spacing shorter than a predetermined spacing when the intermediate member associated with one of a first group of said types is operated and for causing a letter spacing at least equal to said predetermined spacing when the intermediate member associated with one of said second group of types is operated, a carbon ribbon feeding device for feeding a carbon ribbon through a printing point, comprising in combination:

(a) a pair of friction rollers for feeding said ribbon in an advancing direction,

(b) a ratchet wheel connected to one of said rollers,

(c) a pair of pawls cooperating with said ratchet wheel at two diametrically opposite sides thereof,

(d) a common member reciprocable concomitantly with the operation of each one of said intermediate members through a forward stroke and a return stroke during the printing of each one of said types,

(e) means connecting said common member with said pair of pawls to cause said common member to simultaneously reciprocate said pair of pawls,

(f) a spring comprised in said connecting means to cause said common member to yieldably operate a first one of said pair of pawls for rotating said ratchet wheel a first increment during said forward stroke, the other pawl of said pair of pawls being effective to rotate said ratchet wheel a second increment during said return stroke,

(g) an element normally effective for preventing said first pawl from being operated by said common member through said spring,

(h) and a member operated by said spacing control mechanism for disabling said element when causing a letter spacing at least equal to said predetermined spacing.

References Cited

UNITED STATES PATENTS

805,060	11/1905	Disbrow	197—151
1,643,266	9/1927	Aichele	197—160
2,161,856	6/1939	Coxhead	197—151
2,224,766	12/1940	Dodge	197—84
2,425,967	8/1947	Toggenburger	197—151
2,609,077	9/1952	Schroder	197—151
2,734,614	2/1956	Page	197—151
2,972,402	2/1961	Howard	197—151
3,026,987	3/1962	Gather	197—165 X
3,151,722	10/1964	Salto	197—17
3,288,262	11/1966	Salto	197—84
3,346,090	10/1967	Goff et al.	197—151 X

ERNEST T. WRIGHT, JR., *Primary Examiner.*