United States Patent [19]

Garberi et al.

[11] **3,889,795**

[45] **June 17, 1975**

[54] **REMOVABLE CARTRIDGE FOR THE INKED RIBBON FOR TYPEWRITERS, CALCULATING MACHINES OR OTHER OFFICE MACHINES**

[75] Inventors: **Sergio Garberi; Lorenzo Bertino,** both of Ivrea, Italy

[73] Assignee: **Ing. C. Olivetti & C., S.p.A.,** Ivrea(Torino), Italy

[22] Filed: **Oct. 20, 1972**

[21] Appl. No.: **299,379**

[30] **Foreign Application Priority Data**

Dec. 6, 1972 Italy 70,460/71
Dec. 30, 1972 Italy 68,360/72

[52] **U.S. Cl.** **197/151**; 197/161
[51] **Int. Cl.** **B41j 33/14**
[58] **Field of Search** 197/151, 160, 161, 162, 197/163, 164, 165

[56] **References Cited**

UNITED STATES PATENTS

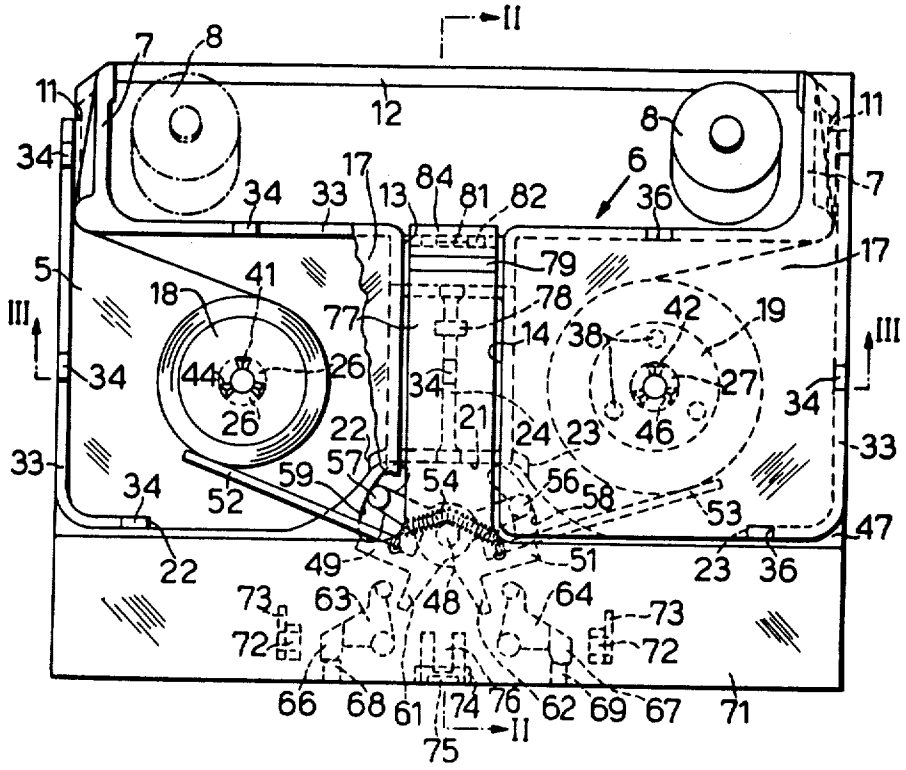
1,015,594	1/1912	Spurgin	197/151
1,871,232	8/1932	Foster	197/151 UX
1,944,023	1/1934	Ford	197/151 UX
2,825,450	3/1958	Lambert	197/151 X
2,902,136	9/1959	Whippo	197/165
3,349,887	10/1967	Goff	197/151
3,425,532	2/1969	Dannatt	197/151
3,513,957	5/1970	Ricciardi et al.	197/151
3,604,549	9/1971	Caudill et al.	197/151
3,632,052	1/1972	Read	197/151 UX
3,643,779	2/1972	Anderson et al.	197/151

Primary Examiner—Ernest T. Wright, Jr.
Attorney, Agent, or Firm—Schuyler, Birch, Swindler, McKie & Beckett

[57] **ABSTRACT**

A removable cartridge for an inked ribbon for an office machine comprises a container rotatably supporting two ribbon-carrying spools. The container has a first side wall provided with a pair of slits for the passage of the inked ribbon from the one to the other of said spools. A pair of apertures in a second side wall opposite to said first side wall allows entry into said container of sensing elements of a ribbon reversal feed mechanism for sensing the amount of inked ribbon on said spools. The sensing elements cooperate with corresponding latch levers of a reversal member, by means of a reversal spring actuates a feed element for driving the spools carrying said ribbon in one sense and the other sense respectively. A closure member of the machine is movable between a first position wherein the cartridge is held on the machine, and a second position wherein the sensing elements are withdrawn from said apertures.

17 Claims, 8 Drawing Figures



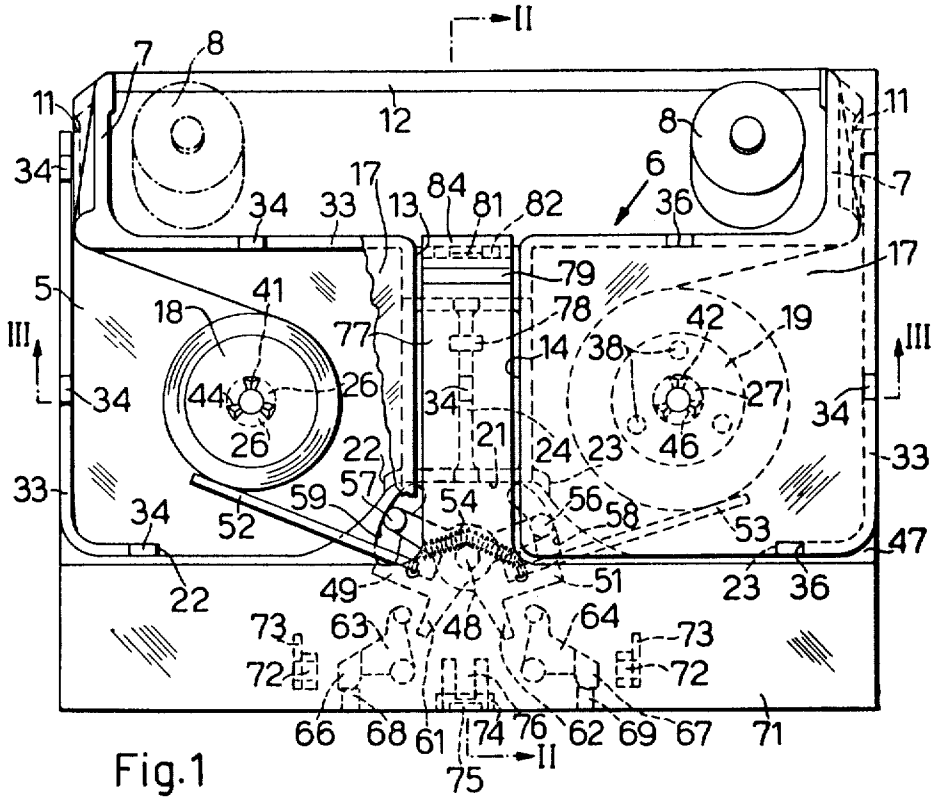

II
7
8
11
12
34
17
33
13
84
81
82
6
36
79
78
77
14
38
42
19
III
41
18
44
26
34
21
24
23
46
27
22
57
59
54
56
58
53
47
52
49
51
23
36
73
63
48
64
72
66
68
61
74
76
62
69
67
71
75

Fig.1

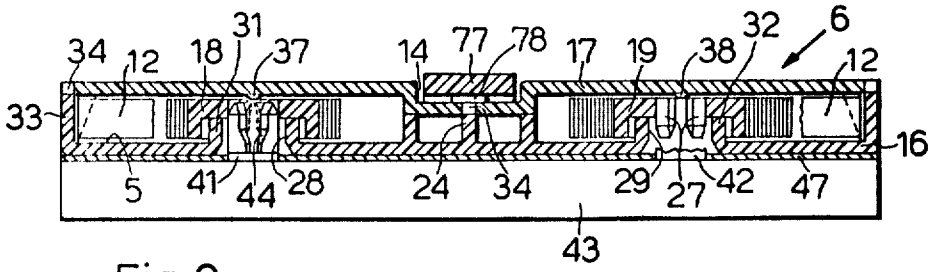
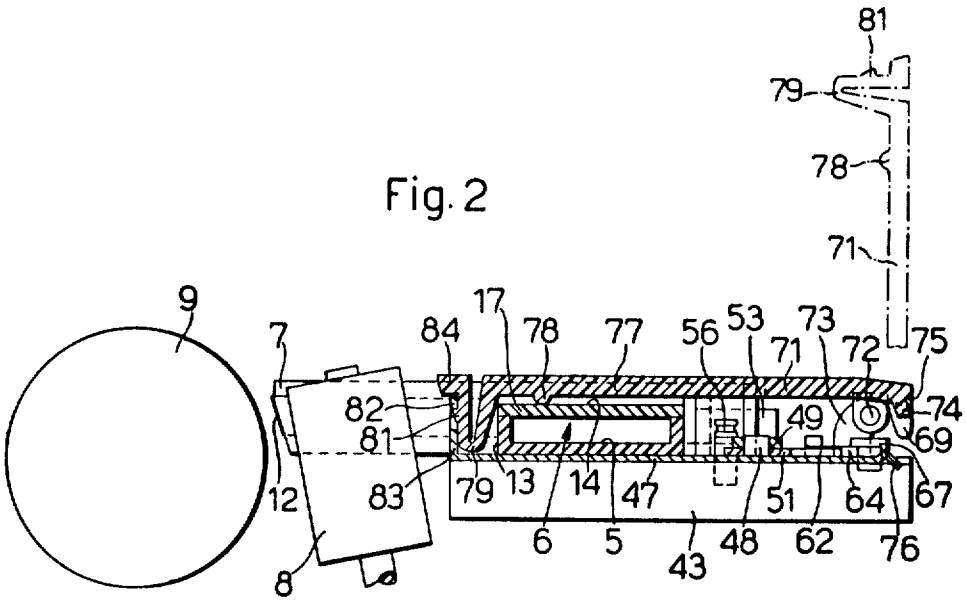

34
12
18
31
37
14
77
78
17
19
38
32
6
33
16
5
41
44
28
24
34
29
27
42
47
43

Fig.3

Fig. 2


81
79
78
71
9
7
17
84
78
77
56
53
71
73
72
75
74
69
82
81
49
12
83
79
13
14
47
51
64
67
6
5
43
48
62
76
8

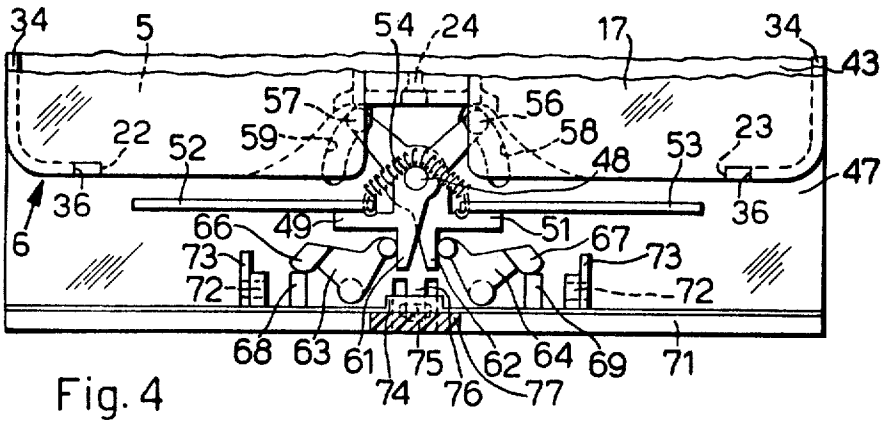

34
5
54
24
17
34
43
57
56
22
59
52
58
48
53
23
47
36
36
6
66
49
51
67
73
73
72
72
68
63
61
75
62
64
69
71
74
76
77

Fig. 4

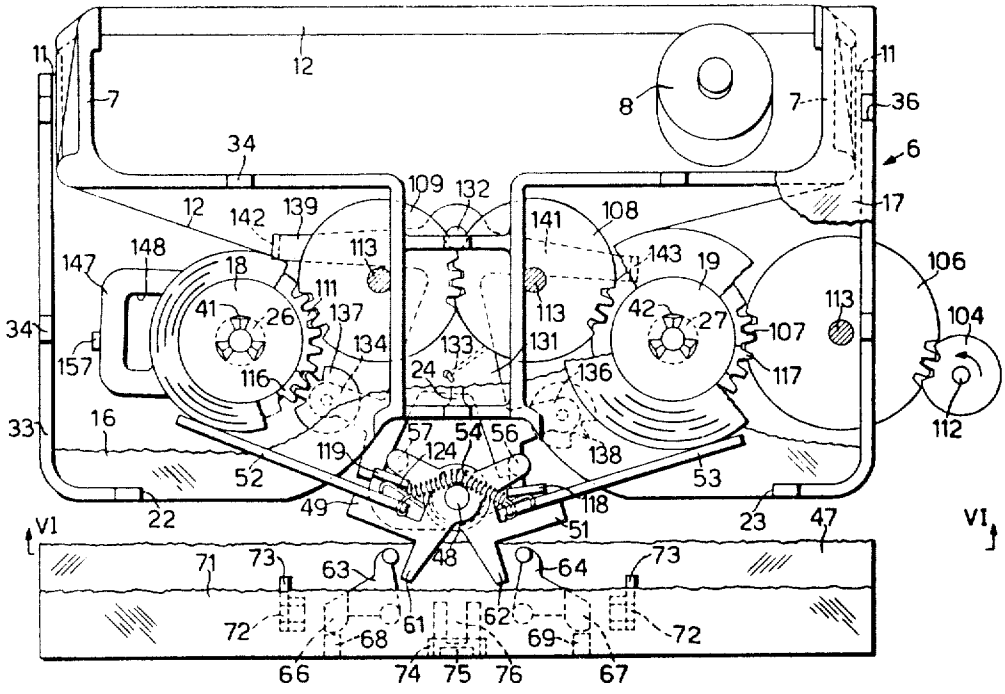

11
12
7
8
36
6
34
109
132
17
142
139
141
108
147
148
18
113
143
19
106
111
41
26
137
42
27
107
104
157
134
133
131
117
116
24
136
112
33
16
57
54
56
119
124
138
52
53
49
118
22
51
23
47
V1
71
73
63
64
48
72
61
62
69
68
66
74
75
76
67

Fig.5

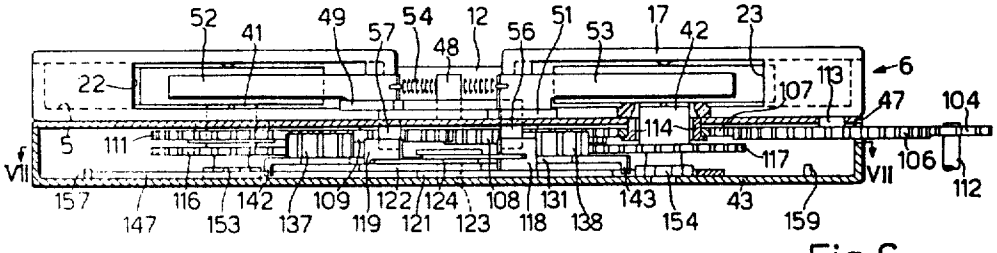

52
41
49
57
54
48
12
56
51
53
17
42
23
6
22
107
113
47
104
5
111
114
117
106
112
157
147
116
153
142
137
109
119
122
121
124
123
108
118
131
138
143
154
43
159

Fig.6

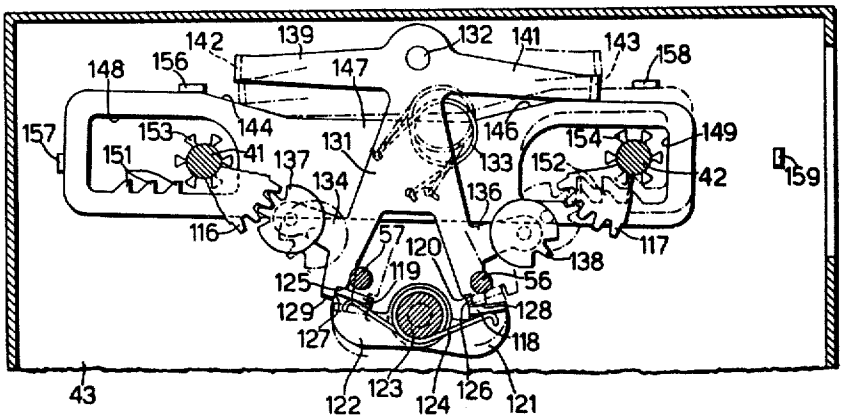

142
139
132
141
143
158
148
156
147
157
153
144
146
154
149
151
41
131
137
133
152
42
159
134
136
116
57
120
117
138
125
119
56
129
128
127
118
43
122
123
124
126
121

Fig.7

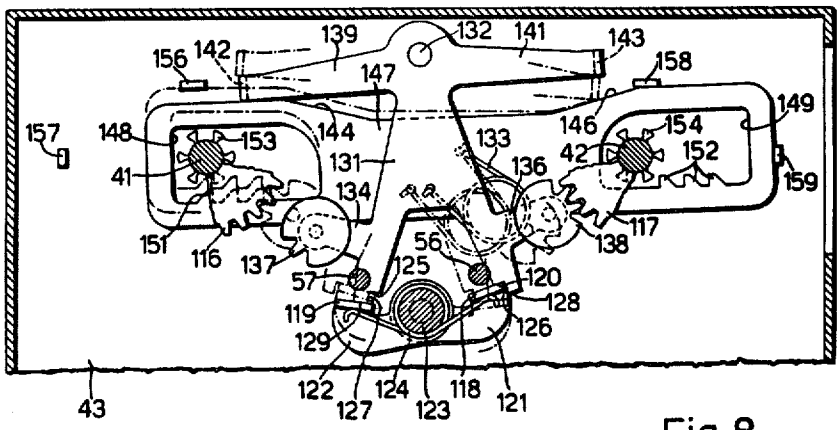

139
132
141
143
156
142
147
158
149
157
148
153
144
146
154
133
42
152
41
131
136
159
134
151
116
137
56
117
138
57
125
120
119
128
129
126
122
127
124
123
118
121
43

Fig.8

REMOVABLE CARTRIDGE FOR THE INKED RIBBON FOR TYPEWRITERS, CALCULATING MACHINES OR OTHER OFFICE MACHINES

BACKGROUND OF THE INVENTION

The present invention relates to a removable cartridge for the inked ribbon for typewritters, calculating machines or other office machines, comprising a container and two ribbon-carrying spools rotatable therein in either direction, the container having at least one main wall to which the axes of both spools are perpendicular, a series of side walls perpendicular to the main wall and a pair of slits in one of the side walls for the passage of the inked ribbon from the one of the other of the spools along a path which, between the slits, lies outside the container.

Cartridges for an inked ribbon are known which are provided with a closed container, in which the ribbon-carrying spools rotate in both directions under the action of a reversal mechanism. The reversal mechanism of the machine is provided with a pair of sensing elements fulcrumed internally on the entrainment pins for the spools. Each sensing element is thrust from the inside against the ribbon coils wound on to the spool, through an aperture in the pin and an aperture in the core of the spool. The sensing elements then control the reversal of the movement of the ribbon, when the number of coils of wound ribbon on a spool is no longer sufficient to hold the sensing element in. The use of senser elements of this type, however, makes the reversal mechanism for the ribbon rather complicated and costly to realise.

Also known are typewriters which are provided with a reversal mechanism for the movement of the ribbon controlled by a sensor element which rests from the outside on the ribbon coils of the feed spool or of the take-up spool. The sensor element thus tests the quantity of wound ribbon, ordering the reversal when this quantity is less than a pre-established minimum number of coils, or else when it is greater than a maximum of coils which is likewise pre-established. This reversal mechanism is very simple and therefore economical, but requires, for the replacement of a used ribbon, that the sensor element be pulled away from the relative spool, so as to allow the spool to be pulled off its pin. It is therefore not possible to use ribbon-carrying cartridges of known type, which have closed containers that do not allow the use of sensor elements which test externally the quantity of ribbon wound on the spools.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a removable cartridge for the inked ribbon for an office machine, comprising a container and two ribbon-carrying spools rotatable therein in either direction of rotation, the container having at least one main wall to which the axes of both spools are perpendicular, a series of side walls perpendicular to the main wall, a pair of slits in one of the side walls for the passage of the ribbon from the one to the other of the spools along a path which, between the slits, lies outside the container, and a pair of apertures in a side wall opposite the said one wall, each of the said apertures being associated with one of the spools and being adapted to allow entry into the container of sensing elements for sensing the amount of inked ribbon on the spools.

The invention further provides an office machine incorporating such a cartridge, means releasably attaching the cartridge to the machine, and a ribbon reversal mechanism including two sensing elements which enter the two apertures respectively and bear against the inked ribbon on the two spools respectively.

The closure member can comprise a closure member pivotally mounted on the machine for movement between a first position in which it holds the cartridge on the machine and a second position in which the cartridge is free to be taken off the machine, the closure member being arranged to act on the sensing elements through a coupling mechanism such that, when the closure member is in the second position, the sensing elements are withdrawn from the apertures.

The cartridge in accordance with the invention is simple and economical. This cartridge allows use of a simple attaching means and a simple reversal mechanism for the movement of the ribbon which, in combination with the cartridge, realise an economical and reliable whole.

BRIEF DESCRIPTION OF THE DRAWING

A preferred embodiment of the invention is described by way of example in the following description with reference to the accompanying drawing, in which:

FIG. **1** is a partial plan view of a cartridge for the inked ribbon embodying the invention and of a detail of a calculating machine on which the cartridge is mounted;

FIG. **2** is a partial section in accordance with the line II—II of FIG. **1**;

FIG. **3** is a partial section in accordance with the line III—III of FIG. **1**;

FIG. **4** is a partial plan view of the cartridge in a special position of the detail of FIG. **1**;

FIG. **5** shows a partial plan view of the cartridge of FIG. **1** with another detail of the calculating machine;

FIG. **6** shows a section in accordance with the line VI—VI of FIG. **5**;

FIG. **7** shows a section in accordance with the line VII—VII of FIG. **6** of some details of FIG. **5**;

FIG. **8** shows the details of FIG. **7** in a second operative position.

DESCRIPTION OF A PREFERRED EMBODIMENT

With reference to FIG. **1**, the cartridge **6** for the inked ribbon **12** comprises a container **5** of plastic material having a substantially parallelepipedal shape. The container **5** is provided at the rear side arms, two arm **7** which embrace a cylindrical writing head **8** of a calculating machine. The head **8** is movable between the arms **7** from a position of rest indicated in a solid line to an end-of-line position indicated in chain-dotted lines, in order to write a line of print on a tally roll **9** (FIG. **2**). An inked ribbon **12** (FIG. **1**) is tensioned between the ends of the arms **7** which are suitably shaped and inclined to present the ribbon **12** parallely to the line of print on the tally roll **9** (FIG. **2**) and at the right angle (FIG. **1**) with respect to the ribbon **12** emerging from the container through two slits **11** adjacent the arms **7**.

The container **5** is closed at the top by a lid **17** and has, in the rear part, a central recess which defines a space **13**, which is connected to a space **14** (FIG. **3**) formed by a channellike depression in the lid **17**. The container **5** (FIG, **1**) is provided, in the front side, with

a central recess which forms a space **21** and with two apertures **22** and **23** through its front side wall. The container **5** also has central ribbing **24**, in line with the spaces **13**, **14** and **21**, which divides it into two equal chambers, in which two spools **18** and **19** are rotatably mounted.

The spools **18** and **19** store the wound inked ribbon **12** and rotate in the container **5** so as to convey the ribbon **12** from the one spool to the other over the arms **7** and through the slits **11**. Each spool **18** and **19** has the shape of a cup turned upside down and is provided with a central hole surrounded by a toothed crown **26** or **27** respectively.

The crowns **26**, **27** have three teeth which are lodged in a hole **28** (FIG. 3) or **29** respectively, formed in a lower portion **16** of the container **5**. The hole **28** or **29** is defined by a sleeve **31** or **32** which protrudes inside the container **5**. On each sleeve **31**, **32** there normally rests the base of the spool **18** or **19**.

The container **5** has, on its walls **33** and on the central ribbing **24**, lugs **34** (FIG. 1) which engages in as many slots **36** in the lid **17**, in order to fix the lid **17** to the container **5**. Internally the lid **17** has hemispherical pips **37** and **38** (FIG. 3) overlying the spools **18** or **19**. The pips **37**, **38** are arranged at 120° one to the other and do not allow the spools **18**, **19** to rise from the respective sleeves **31**, **32** during the rotation for the advance of the inked ribbon **12**.

Two revolving shafts **41** and **42** are mounted on a horizontal base **43** of the machine. The shafts **41** and **42** are connected to an advance and reversal device for the movement of the inked ribbon **12** contained inside the base **43** and which will be described subsequently. These shafts **41** and **42** are shaped at the top so as to have in their ends three incisions in the form of an inverted pyramid **44** or **46** respectively (FIG. 1) capable of engaging with the teeth of the crowns **26** and **27** presented by the spools **18** and **19** respectively.

Above the base **43** (FIG. 2) and fixed thereto there is arranged a horizontal platform **47**, on which rests the cartridge **6**. Fixed on the platform **47** there is a pin **48**, about which there are fulcrumed two sensing elements **49** and **51** (FIG. 1) of the reversal mechanism for the inked ribbon **12**. These sensing elements **49**, **51** comprise a pair of scissor levers **52** and **53** which, under the action of a spring **54**, normally rest on the inked ribbon **12** wound on the spools **18** and **19**, at the same time keeping the coils tight on the spools **18** and **19**. The spring **54** is fixed with its ends in corresponding **19**. The spring of the levers **52** and **53** and is tensioned at its central portion round the pin **48**.

Fixed on the sensing elements **49** and **51** are corresponding pins **56** and **57**, which cooperate through slotted holes **58** and **59** in the platform **47** with a latch lever **121** or **122** (FIG. 7) of the mechanism for control of the reversal of the movement of the inked ribbon **12** contained in the base **43**. Each sensing element **49**, **51** (FIG. 1) has a tongue **61**, **62** respectively, with which a releasing device **63**, **64** respectively can cooperate. The two releasing devices **63**, **64** are fulorumed on the platform **47** and each has a projection **66**, **67** respectively, capable of cooperating with a cam **68**, **69** respectively. These cams **68** and **69** are constituted by lugs projecting at the bottom and on the front side of a closure plate **71** of an inverted "T" shape.

The closure plate **71** is made of plastic material and is pivoted on two pins **72** on two tongues **73** of the platform **47**. The closure plate **71** can thus be swung up to the open, broken line position of FIG. **2**. In its front edge the closure plate **71** (FIG. 2) has a central projection **74**, in which there is made a "V" incision **75** capable of cooperating with a leaf spring **76** integral with the platform **47**, when the closure plate **71** is rotated by 90° into the open position.

The closure plate **71** includes on the rear side a tongue **77**, which is lodged in the space **14** (FIG. 3) of the lid **17**, and a lower projection **78** keeps the cartridge **6** in contact with the platform **47**.

The tongue **77** ends with a downwardly bent projection **79** (FIG. 2) in the form of a V which is lodged in the rear space **13** of the container **5**. The projection **79** has, at the rear, a detent lug **81** capable of engaging with a shoulder **82** presented by a tongue **83** of the platform **47**. The projection **79** has, furthermore, a rear ledge **84** substantially coplanar with the tongue **77** by means of which, taking advantage of the elasticity of the material, and by exerting a slight manual pressure, one can engage or disengage the detent lug **81** from the shoulder **82**. The space **13** of the container **5** allows the tongue **83** to remain substantially aligned with the rear wall of the container **5** (FIG. 1) and outside the zone of rectilinear movement of the head **8**.

To replace a used cartridge **6** by a new one, one acts in the following manner. With one hand one exerts a slight pressure on the ledge **84** (FIG. 2) of the projection **79** in order to disengage the detent lug **81** from the shoulder **82** and then one swings up the closure plate **71**. The cams **68** (FIG. 1) and **69** bear against the respective projections **66** and **67** of the releasing devices **63** and **64** respectively, causing these devices **63** and **64** to rotate, the first device **63** in the clockwise direction and the second device **64** in the anticlockwise direction. Each releasing device **63**, **64** engages the tongue **61** and **62** of the respective sensing element **49**, **51**. The two sensing elements **49**, **51** rotate, the first sensing element **49** in the anticlockwise direction and the second sensing element **51** in the clockwise direction against the action of the spring **54**.

After a rotation of about 90° of the closure plate **71**, the leaf spring **76** engages in the incision **75**. The releasing devices **63** and **64** have rotated the levers **52** and **53** of the sensing elements **49** and **51** out of the container **5**, arranging them aligned in accordance with one and the same plane parallel to the shafts **41** and **42** as shown in FIG. **4**. The closure plate **71** is then in the vertical position and the sensing elements **49** and **51** are disconnected from the cartridge **6**, allowing the removal from the platform **47** of the cartridge **6**.

The used cartridge **6** is then lifted off with one hand and is replaced by another one by resting this latter on the platform **47** so as to bring the crowns **26** and **27** (FIG. 1) into engagement with the shafts **41**, **42**. One then flaps down the closure plate **71** overcoming the resistance of the leaf spring **76**.

The spring **54** causes the sensing elements **49** and **51** to rotate, the first sensing element **49** in the clockwise direction and the second sensing element **51** in the anticlockwise direction. The levers **52** and **53** pass through the apertures **22** and **23** of the container **5** and rest on the coils of inked ribbon **12** wound on the two spools **18** and **19**. By now exerting a slight pressure downwards on the ledge **84** of the projection **79**, the detent lug **81** snaps under the shoulder **82** of the tongue **83** (FIG. 2). The lower projection **78** of the tongue **77** is

lodged in the space **14** (FIG. **3**) of the lid **17** and keeps the cartridge **6** against the platform **47** through the elasticity of the tongue **77**, and therefore in this way fixed removably to the machine. The two releasing devices **63** and **64** (FIG. **1**) rotate loosely and remain inactive during the functioning of the reversal mechanism for the inked ribbon **12**.

During the change of the cartridge **6**, the stretch of inked ribbon **12** which projects out from the arms **7** is not in tension, because the spools **18** and **19** may have been rotated slightly in the clockwise or anticlockwise direction by the incisions **44** and **46** during the engagement with the crowns **26** and **27**. Nevertheless, no sooner does the writing cycle begin than the inked ribbon **12** is brought rapidly into tension. During the functioning the levers **52** and **53** exert a certain restraining pressure on the coils of the inked ribbon **12**.

With reference to FIG. **5**, the reversal mechanism for the feed movement of the inked ribbon **12** comprises a series of flat gears **104, 106, 107, 108, 109** and **111** always in mesh one with another. The gear **104** is integral with a driving shaft **112** of the calculating machine, always revolving in the anticlockwise direction. The gears **106, 108** and **109** are rotary on axes **113** fixed below the platform **47** (FIG. **6**). The gears **107** and **111** are rotary on sleeves **114**, they too fixed at the bottom to the platform **47**. Two gears **116, 117**, similar to the gears **111** and **107** respectively, are in one piece with the shafts **41** and **42** respectively, which are rotatable in the sleeves **114**. The gears **116** and **117** are arranged below the gears **111** and **107**.

Each sensing element **49, 51** is adapted to cooperate through its pin **56** or **57** with a tongue **118** or **119** respectively of the corresponding latch lever **121** or **122** (FIG. **1**), both levers **121** and **122** being fulcrumed on a pin **123** fixed on the base **43**. A coil spring **124**, fitted over the pin **123**, has its ends bearing against the tongues **118** and **119** so as to thrust the lever **122** in the clockwise direction and the lever **121** in the anticlockwise direction about the pin **123**. Under the action of the coil spring **124**, each tongue **118, 119** will be arrested either on a front shoulder **128** or **129** respectively or on a rear shoulder **120** or **125** respectively of a reversal member **131**.

The reversal member **131** is constituted by a rocker fulcrumed on a pin **132** fixed on the base **43**. The rocker **131** can move from a first position shown in FIG. **7** to a second position shown in FIG. **8** and vice versa, under the action of a coiled expansion spring **133**. The rocker **131** (FIG. **7**) has two lugs **134** and **136** on each of which there is loosely revolving a pinion **137** or **138** respectively. Each pinion **137, 138** is capable of engaging selectively with the gear **111** (FIG. **6**) or with the gear **107**, in order to connect the gear **111** with the gear **116** and the gear **107** with the gear **117**.

The rocker **131** is provided with two arms **139** (FIG. **7**) and **141**, each of which has a tongue **142** and **143** respectively. Each tongue **142, 143** can cooperate with a cam part **144** or **146** respectively of a reload element **147**.

The reload element **147** is constituted by a sliding plate having a generally rectangular shape and which rests on the bottom of the base **43**. The reload element **147** has two windows **148** and **149** in which there are formed rack teeth **151** or **152** respectively arranged in the same horizontal plane. The teeth **151, 152** can engage with a pinion **153** or **154** respectively which is in one piece with the shaft **41** or **42** respectively and hence with the gear **116** or **117** respectively.

The coiled expansion spring **133** is connected at one end to the rocker **131** and at the other end to the reload element **147**. In the first position of the rocker **131** and of the reload element **147** of FIG. **7**, the tongue **118** of the lever **121** is stopped against the front shoulder **128**, whilst the tongue **119** of the lever **122** is stopped against the rear shoulder **125** of the rocker **131**. The tension of the coiled expansion spring **133** is such as to keep the rocker **131** stopped with a lateral shoulder **127** against the tongue **119**. The reload element **147** is, in its turn, urged by the coiled expansion spring **133** against two stops **156** and **157** of the base **43** and with the pinion **153** adjacent to but disengaged from the teeth **151**. In the second position of the rocker **131** and of the reload element **147** of FIG. **8**, the tongue **118** of the lever **121** is stopped against the rear shoulder **120** and the tongue **119** is stopped against the front shoulder **129**. The tension of the coiled expansion spring **133** keeps the rocker **131** stopped with a lateral shoulder **126** stopped against the tongue **118**. The reload element **147** is, in its turn, stopped against two fixed stops **158** and **159** of the base **43** and with the pinion **154** adjacent to but disengaged from the teeth **152**.

In operation it will be assumed that the rocker **131** and the reload element **147** are in the first position as shown in FIGS. **5, 6** and **7**, in which the pinion **137** meshes with the gears **111** and **116**. The gear train from **104** to **111** then causes the ribbon **12** to wind on to the spool **18**, whereby the ribbon **12** shifts from the right to the left in FIG. **5**. The lever **52** withdraws the pin **56** from the tongue **118** against the action of the spring **54**. On the contrary, the pin **57** of the lever **53** approaches the tongue **119** under the action of the spring **54**. The inked ribbon **12** continuing to unwind from the spool **19**, the lever **53** progressively approaches towards the center of the spool **19** whereby the pin **57** engages the tongue **119** and begins to cause the lever **122** (FIG. **7**) to rotate in the anticlockwise direction against the action of the coil spring **124**, over which the spring **54** (FIG. **5**) prevails. When the coils of inked ribbon **12** wound on the spool **19** are less than a prefixed quantity, the tongue **119** disengages from the lateral shoulder **127** (FIG. **7**), whereby the coiled expansion spring **133** causes the rocker **131** to rotate rapidly in the anticlockwise direction. The rocker **131** passes from the first position to the second one, placing itself in the position shown by broken lines in FIG. **7**. The tongue **118** in its turn, under the action of the coil spring **124**, then stops on the rear shoulder **120**, whilst the tongue **119** remains rested against the pin **57**, until the coils of inked ribbon **12** (FIG. **5**) increase on the spool **19**, whereby the lever **53** draws away radially and therefore the tongue **119** engages the front shoulder **129** (FIG. **8**). The pinion **137** ceases to engage the gears **111** (FIG. **5**) and **116**, thereby stopping temporarily the shaft **41**. The pinion **138** then meshes with the gears **107** and **117**, whereby the shaft **42** can rotate.

At the same time the tongue **143** (FIG. **7**) ceases its engagement with the cam part **146** and the tongue **142** engages with the cam part **144**. The coiled expansion spring **133** assumes a second position shown in broken lines, causing the reload element **147** to shift backwards until this latter is stopped against the fixed stop **158** as shown in broken lines in FIG. **7**. The teeth **152** therefore come into mesh with the pinion **154**.

Because of the rotation of the gears from **104** to **107** (FIG. 5) the pinion **138** transmits the movement to the gear **117**, and thence to the shaft **42**, whereby the inked ribbon **12** starts to wind on to the spool **19**. At the same time the pinion **154** (FIG. 7), which is rotating in the anticlockwise direction, meshes with the teeth **152** and shifts the reload element **147** towards the right until it stops against the fixed stop **159**. During this displacement, the tongue **142**, through the cam part **144**, shifts the left hand end of the reload element **147** forwards, so as to prevent the teeth **151** from encountering the teeth of the pinion **153**. With this displacement, the various elements assume the stable configuration of FIG. **8** already described, whereby the coiled expansion spring **133** now tends to urge the rocker **131** back from the position of FIG. **8** to that of FIG. **7**.

The inked ribbon **12** (FIG. 5) continues to wind on to the spool **19**, whereby the lever **53** moves radially against the action of the spring **54**, drawing away from the center of the spool **19** and drawing the pin **57** away from the tongue **119**. The lever **52** moves on the contrary radially under the action of the spring **54** towards the center of the spool **18** and moves the pin **56** towards the tongue **118**. Eventually the pin **56** engages the tongue **118**, causing the lever **121** (FIG. **8**) to rotate in the clockwise direction against the action of the coil spring **124** until the tongue **118** ceases to engage the lateral shoulder **126**. The coiled expansion spring **133** then causes the rocker **131** to rotate rapidly in the clockwise direction, thereby to pass from the second position to the first position as shown by broken lines in the FIG. **8**. The coiled expansion spring **133** assumes the position shown in broken lines in FIG. **8**.

The pinion **138** disengages from the gears **107** and **117** (FIG. **5**), whereby the shaft **42** ceases to rotate, and the pinion **137** meshes with the gears **111** and **116**. The tongue **142** (FIG. **8**) disengages from the cam part **144** whilst the tongue **143** engages the cam part **146**. The coiled expansion spring **133** shifts the reload element **147** backwards until it stops against the stop **156** as shown by broken lines in FIG. **8**. The teeth **151** mesh with the pinion **153**. The tongue **119**, under the action of the coil spring **124**, engages with the rear shoulder **125**, whilst the tongue **118** remains rested against the pin **56**, until the coils of inked ribbon **12** (FIG. **5**) wound on the spool **18** increase, when the lever **52** withdraws radially and hence the tongue **118** engages the front shoulder **128** (FIG. **8**).

Through the rotation of the gears from **104** (FIG. **5**) to **111**, the pinion **137** transmits the movement to the gear **116** and hence to the shaft **41** whereby the inked ribbon **12** resumes its winding on the spool **18**. At the same time the pinion **153** (FIG. **8**), by rotating in the clockwise direction, meshes with the teeth **151** and shifts the reload element **147** until it stops against the fixed stop **157**. During this displacement the tongue **143**, engaging the cam part **146**, moves the right hand end of the reload element **147** forwards so that the teeth **152** do not encounter the teeth of the pinion **154**. The various elements therefore resume the stable configuration of FIG. **7**.

We claim:

1. A removable cartridge for an inked ribbon for an office printing machine of the type including a supporting platform, two motive shafts rotatably projecting from said platform, a ribbon reversal feed mechanism including two sensing elements for rotating one or another of said two motive shafts in one predetermined sense of rotation, a closure plate including a central tongue, an engaging tongue projecting from said platform, said closure plate being fulcrumed on said platform between an inoperative location and an operative location for causing said central tongue to engage said engaging tongue in correspondance with said operative location of said closure plate, and means connecting said closure plate with said two sensing elements for moving said sensing elements from inoperative positions away from said motive shafts in correspondence with said inoperative location of said closure plate of operative positions of said sensing elements near said motive shafts, in correspondence with said operative location of said closure plate, said cartridge comprising

a. a container including a main wall, a series of side elements connected to said main wall perpendicular to said main wall, two ribbon spools, means rotatably supporting said spools in lateral spaced relation within said container about an axis perpendicular to said main wall, means for accomodating said motive shafts concentrically with said spools, and an inked ribbon having ends fixed to said spools and wound in coils on said spools, one of said side elements defining a pair of slits for the passage of said inked ribbon from the one to the other of said spools outside said container, and said spools being provided with corresponding engaging means for engaging said motive shafts;

b. aperture means on said container for causing said sensing elements during the movement thereof from said inoperative positions to said operative positions to bear against said coils of ribbons wound on said spools, and sense the amount of coils of ribbon wound on said spools; and

c. first means defining a recess between said two spools in said main wall for cooperating with said tongue of said closure plate in correspondence with the operative location of said closure plate for fixing said container on said platform jointly to the bearing of said sensing elements against said coils.

2. In an inked ribbon cartridge including a parallelepipedal container having top and bottom walls interconnected by side walls, a pair of ribbon spools variably winding coils of inked ribbon thereon, said spools being in lateral spaced relation within said container, and means included in said container for rotatably supporting said spools about axes perpendicular to said top and bottom walls, one rear wall of said side walls including a pair of slots for the passage of a portion of said ribbon from the one to another of said spools outside container, and said bottom wall having a pair of openings therethrough concentrically aligned with said ribbon spools for causing a pair of spindle means of a printing calculating machine to engage said pair of spools, the combination comprising

a. a pair of arm members projecting from said rear wall adjacent to said pair of slots for guiding said portion of ribbon parallel to said rear wall a predetermined distance from said rear wall along a line of said printing calculating machine, said spindle means being supported by a platform fixed to said printing calculating machine, and said arm members and said ribbon defining a space accomodating a printing head of said calculating machine in correspondence with movement of said printing head along said printing line;

b. means defining apertures in a front wall of said side walls opposite to said rear wall for freely receiving two sensing levers of a ribbon reversal feed mechanism pivoted on said platform of said printing calculating machine, said two spools being accessible by said sensing levers through said apertures to be sensed for a predetermined amount of coil wound thereon to cause said feed mechanism to drive said pair of spindles in one sense and the other sense respectively in dependence on said amount;

c. a pair of covering portions disposed above said spools and included in said top wall for covering said pair of spools; and

d. means defining a supporting surface in said container adjacent to said pair of covering portions and recessed therein for cooperating with a tongue of a closure member pivotally supported by said platform for preventing undesired movement of said container and said ribbon jointly with the sensing of said coils by said sensing levers.

3. A removable cartridge for an inked ribbon of a calculating machine of the type including a supporting platen, a printing head movable transversely of said platen, a supporting platform transversely stationary with respect to said platen, two motive shafts projecting from said platform and rotatably supported therefrom, a ribbon reversal feed mechanism, two sensing levers fulcrumed on said platform and operatively connected to said feed mechanism for rotating one or another of said two motive shafts in one predetermined sense of rotation, a closure plate including a central tongue having a detent lug, an engaging tongue having a shoulder a projecting from said platform, said closure plate being fulcrumed on said platform between an inoperative and an operative location, resilient means for causing said dentent lug of said central tongue to engage said shoulder of said engaging tongue in corresponding with said operative location of said closure plate and means connecting said closure plate with said two sensing levers for position said sensing levers from inoperative positions away from said motive shafts in correspondence with said inoperative location of said closure plate to operative positions of said sensing levers near said, motive shafts in correspondence with said operative location of said closure plate, said cartridge comprising:

a. a container including a main wall, a series of side walls connected to said main wall perpendicular to said main wall, two ribbon spools, means rotatably supporting said spools in lateral spaced relation within said container about axes perpendicular to said main wall, and an inked ribbon having ends fixed to said spools and wound in coils in said spools, one side wall of said side walls defining a pair of slits for the passage of a portion of said inked ribbon from the one to the other of said spools outside said container, and said spools being provided with corresponding engaging means for engaging said motive shafts;

b. a pair of arm members projecting from said one side wall for guiding said portion of inked ribbon parallel to said platen and accomodating said printing head along the transverse movement thereof;

c. aperture means in said container for causing said sensing levers in said operative positions to be rotated in response to the amount of coils of inked ribbon wound on said spools;

d. first means defining a recess in said main wall between said axes for cooperating with said central tongue, in correspondence of the operative location of said closure plate, and fixing said container on said platform; and

e. second means defining a space in said one side wall adjacent said recess for accomodating said engaging tongue and said detent lug of said central tongue in the operative location of said closure member, aligning said dentent lug with said one side wall.

4. A removable cartridge for an inked ribbon for an office machine, comprising a container and two ribbon-carrying spools rotatable therein in either direction of rotation, said container having at least a main wall to which the axes of said spools are perpendicular, a series of side walls perpendicular to said main wall, a pair of slits in one of said side walls for the passage of the ribbon from the one to the other of said spools along a path which, between the slits, lies outside said container, wherein said machine is of the type including two spindles for engaging said spools, two sensing elements pivoted on said machine, parallel to said axes for sensing the amount of ribbon carried by said spools, a feed reversal mechanism connected to said sensing elements for driving said two spindles in response to the position of said sensing elements, and means for attaching said cartridge to the machine, wherein the improvement comprises: a pair of apertures in a side wall opposite said one side wall, each of said apertures being associated with one of said spools, said sensing elements entering said container thru said apertures to sense said amount of ribbon on said spools, and said attaching means comprising a closure member, pivot means supporting said closure member on the machine for movement between a first position in which said closure member holds said cartridge fixed on the machine and a second position in which said cartridge is free to be taken off said machine, and a coupling mechanism arranged on said closure member in order to act on said sensing elements for withdrawing said sensing elements from said apertures when said closure member is in said second position.

5. A removable cartridge according to claim **4**, wherein said sensing elements comprise a pair of scissor levers mounted on a pivot on the machine and biased by a spring to rotate in opposite senses, thereby entering the two apertures respectively, said coupling mechanism acting on said levers to rotate said levers against the action of the spring, and said cartridge container having a recess in said opposite wall accommodating said pivot.

6. A removable cartridge according to claim **5**, wherein said closure member comprises a tongue, said tongue, in said first position of said closure member, being received within a recess of said main wall of said cartridge container and being swung away from said main wall recess on movement to said second position of said closure member.

7. A removable cartridge according to claim **6**, wherein the free end of said tongue remote from said pivot means of said closure member ends in a V-shaped projection, said projection carrying a detent lug for engaging a shoulder fixed to the machine, thereby holding said closure member releasably in the first position, and said cartridge wall is recessed to accomodate said projection and shoulder.

8. A removable cartridge according to claim 7 to said ribbon slits to guide said ribbon outside said container over a path spaced from said one side wall, said two arms projecting from said one side wall for defining a space between said ribbon and said one side wall, within which a printing head of the machine is movable, said V-shaped projection and said shoulder being outside the path of movement of said printing head.

9. A inked ribbon feed mechansim for an office machine comprising:

a. a cartridge including a container, two spools rotatable in said container, and inked ribbon having one end attached to one of said two spools and the other end attached to the other of said two spools, said ribbon being wound in coils over said spools, two slits in said container for the passage of said inked ribbon from the one to the other of said two spools outside said container and means defining a passage in said container;

b. supporting means for removably supporting said container on said office machine;

c. two spindle means rotatable on said supporting means about parallel axes and engageable by said two spools for respectively rotating said spools in either direction of rotation;

d. two sensing elements movably supported by said supporting means between an inoperative position away from said spools and an operative position wherein said sensing elements bear against said coils of ribbon wound on said spools;

e. a ribbon reversal mechanism operatively connected with said sensing elements when in said operative position for driving one of said two spindle means in a predetermined sense of rotation upon sensing a predetermined amount of said coils being wound on one of said spools;

f. a closure member movably supported by said supporting means between a first position wherein said closure member fixes said container over said supporting means and a second position wherein said closure member releases said container for allowing said container to be taken off said supporting means along a direction parallel to said axis, said passage defining means of said cartridge lying in a path outside said sensing elements positioned in said inoperative position; and

g. a coupling mechanism connecting said closure member with said two sensing elements for causing said sensing elements to be positioned in said inoperative position when said closure member is in said second position, so that said container can be freely taken off.

10. An inked ribbon feed mechanism according to claim 9 wherein said container includes a main wall rotatably supporting said two spools about axes perpendicular to said main wall, a series of side walls perpendicular to said main wall, said two slits being included in said side walls and said two sensing elements being in said inoperative position away from said container.

11. An inked ribbon feed mechanism according to claim 9, wherein said supporting means comprise a platform of said machine and said two sensing elements comprise a pair of scissor levers mounted on a pivot fixed to said platform, said pair of scissor levers being biased by a spring to rotate in opposite senses toward said two spools when in said operative positions; and said coupling mechanism acting on said pair of scissor levers to rotate said pair of scissor levers against the action of said spring in said second position of said closure member.

12. An inked ribbon feed mechanism according to claim 9, wherein said closure member includes a T shaped plate having two arms and a central tongue and wherein said supporting means comprise a platform, pivot means of said platform pivotally mounting said two arms of said T shaped plate, and a shoulder projecting from said platform, one end of said central tongue of said T shaped plate including a V shaped projection and said projection carrying a detent lug for engaging said shoulder in the first position of said closure member, and fixing said container over said platform.

13. An inked ribbon feed mechanism according to claim 9, wherein said ribbon reversal mechanism comprises a reversal member engaging, between a first position and a second position, a corresponding drive element of a ribbon drive mechanism in order to effect drive of said ribbon spools in one sense and the other sense, respectively, a reversal spring and means carrying said reversal spring for causing said reversal spring to bias said reversal member from said first position towards said second position and vice-versa a pair of latches for arresting said reversal member in said first position and in said second position against the action of said reversal spring, each of said pair of latches cooperating with a corresponding one of said two sensing elements in order to disengage said reversal member when the inked ribbon on the corresponding spool has reached a minimum quantity such as to require reversal of the inked ribbon, thereby causing said reversal spring to move said reversal member from said first position to the second position and vice-versa and a reload element responsive to the movement of said reversal member for repositioning said carrying means for causing said reversal spring to bias said reversal member from said second position back towards said first position and vice-versa.

14. An inked ribbon feed mechanism according to claim 13 wherein said ribbon drive mechanism comprises two spool gears coupled to said two spindle means, respectively, and a train of further gears driven by a drive shaft rotatable in a single direction, two oppositely rotating ones of said further gears being parallel to and coaxial with said two spool gears, respectively, and said drive elements including two pinions freely rotatable on said reversal member, said reversal member, in said first position and in said second position causing a corresponding one of said pinions to be meshed with a corresponding one of said spool gears and with the further gear coaxial with said spool gear.

15. A device for fixing a removable cartridge for inked ribbon to an office machine, wherein said cartridge comprises: a container rotatably supporting two ribbon-carrying spools, a cover of said container to which the axes of said spools are perpendicular, a series of side walls perpendicular to said cover, a pair of slits in one of said side walls for the passage of the ribbon from the one to the other of said spools, and a pair of apertures in a side wall opposite the said one side wall, each of said apertures being associated with a corresponding one of said spools, said office machine comprising a reversably feeding ribbon mechanism provided with a pair of sensing elements for sensing the mount of ribbon on said spools, said fixing device comprising a closure member, a coupling mechanism

mounted on said closure member cooperating with said sensing elements, and pivot means of said machine pivotally mounting said closure member for movement between a first position wherein said closure member cooperates with said cover for holding said cartridge fixed to said machine and a second position wherein said coupling mechanism withdraws said sensing elements from said apertures.

16. A device according to claim **15,** wherein said coupling mechanism comprises: cam means on the closure member and wherein said sensing elements comprise a pair of scissor levers biased by a spring for bearing against said ribbon on said two spools, respectively, said cam means being arranged to transmit thrust to said levers, in order to rotate said levers against the action of said spring when the closure member is moved from said first position to said second position.

17. A device according to claim **16,** wherein said cam means transmit thrust to said levers through two rocking levers pivotally mounted on the machine.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,889,795 Dated June 17, 1975

Inventor(s) Sergio Garberi, Lorenzo Bertino

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

The foreign application priority data should read as follows:

October 21, 1971 Italy ... 70460-A/71

May 3, 1972 Italy ... 68360-A/72

Signed and Sealed this

Twenty-second Day of February 1977

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks