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Lehmann

[11] **3,887,056**

[45] **June 3, 1975**

[54] **DEMOUNTABLE-PLUGGABLE TENSIONING AND RE-INKING RIBBON CARTRIDGE**

[75] Inventor: **Jerry Hans Lehmann**, Rochester, N.Y.

[73] Assignee: **Burroughs Corporation**, Detroit, Mich.

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[21] Appl. No.: **344,268**

[52] **U.S. Cl.** **197/168**; 197/151; 101/336; 197/171

[51] **Int. Cl.** **B41j 33/10**

[58] **Field of Search** 101/336; 197/151, 171, 197/168

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IBM Technical Disclosure Bulletin, "Ribbon Cartridge with Brake," Arena et al., Vol. 10, No. 4, Sept. 1967, pp. 484, 485, 197/151.

Primary Examiner—Ernest T. Wright, Jr.
Attorney, Agent, or Firm—Carl Fissell, Jr.; Kevin R. Peterson; Paul W. Fish

[57] **ABSTRACT**

A demountable-pluggable ribbon cartridge having self-contained adjustable tensioning and re-inking means is provided with a plurality of ribbon inking rollers operable in conjunction with an inking tension roller and a demountable impact receiving printing matrix, the cartridge being removably attachably engagable with the frame of an associated piece of apparatus such that the printing device is operably disposed adjacent to a reciprocably movable anvil, the adjustable self-tensioning means of the cartridge serving to hold the ribbon in a taut state in a printing position adjacent to the anvil and over the face of the printing matrix and to hold the ribbon in frictional contact with cylindrical re-inking members carrying on their peripheries a deformable porous pen-inked foam material. The inked ribbon in the form of an endless loop is movably disposed within an interior peripheral portion of the cartridge, the self-tensioning means comprising an opposing pair of members having discontinuous confronting surface portions between which the ribbon is moved.

10 Claims, 6 Drawing Figures

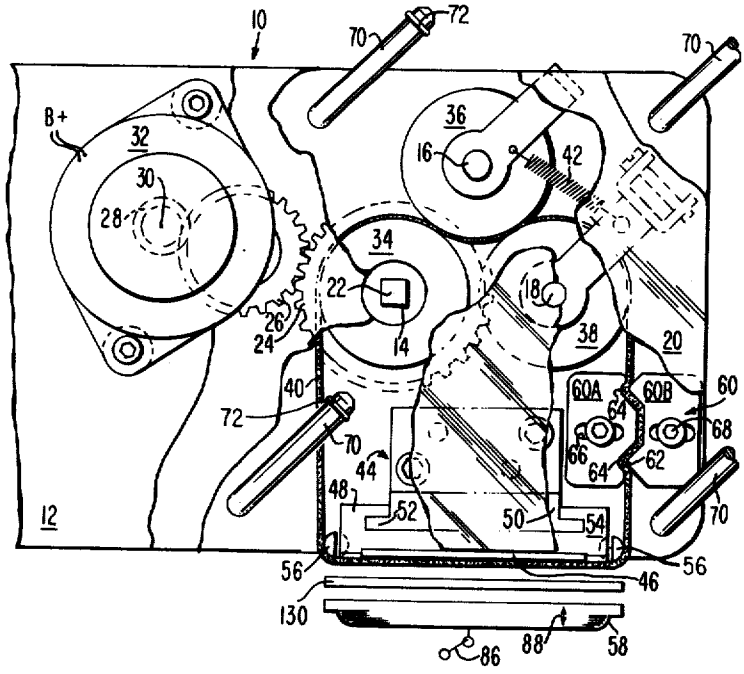


FIG. 1.

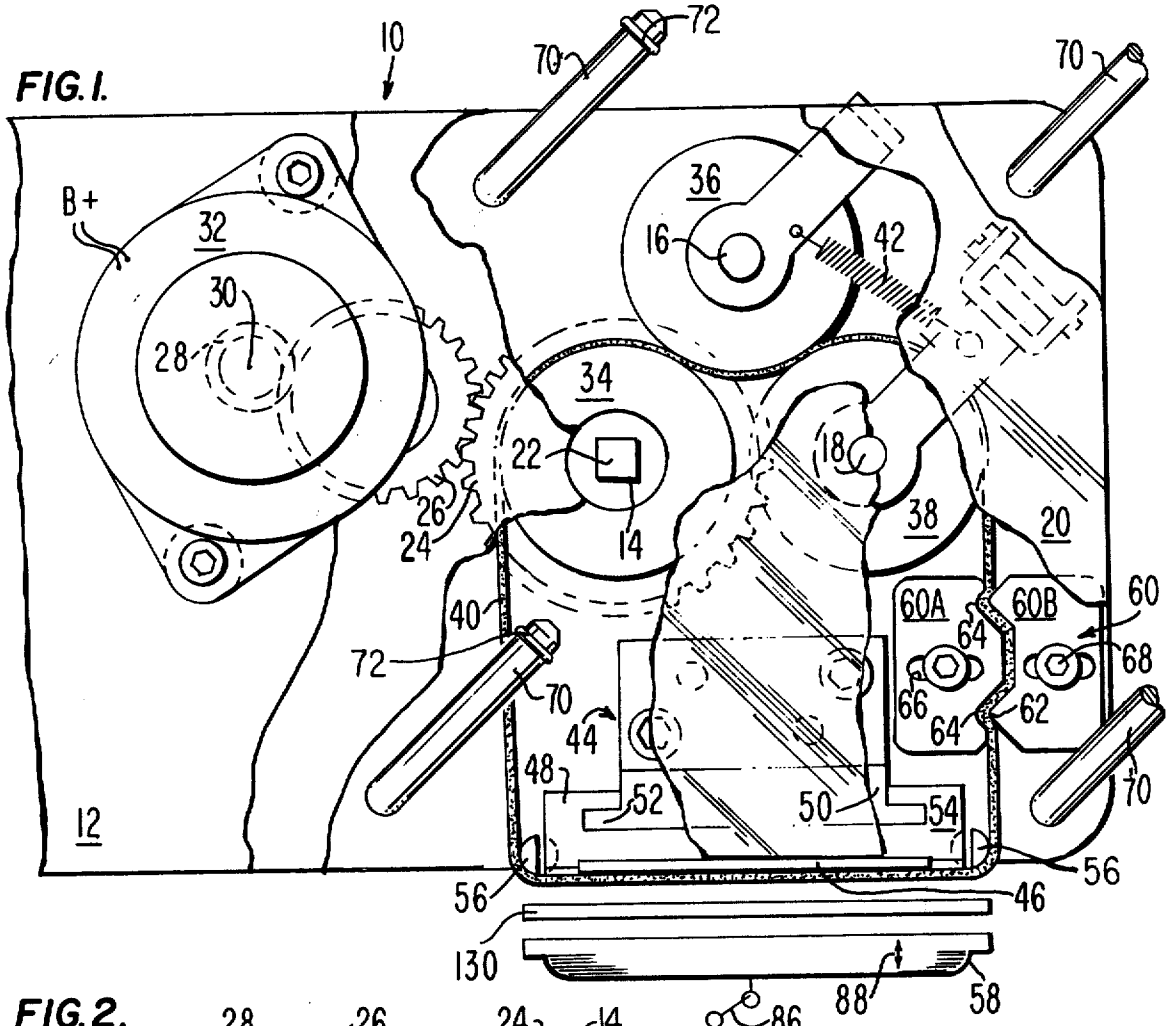


FIG. 2.

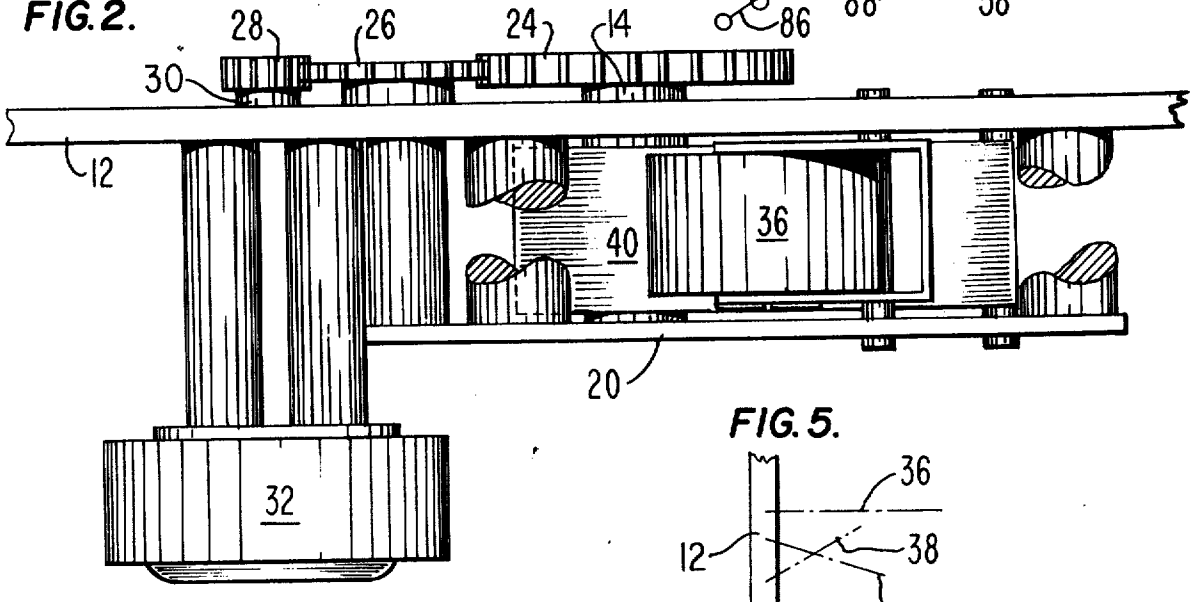


FIG. 5.

FIG. 3A.

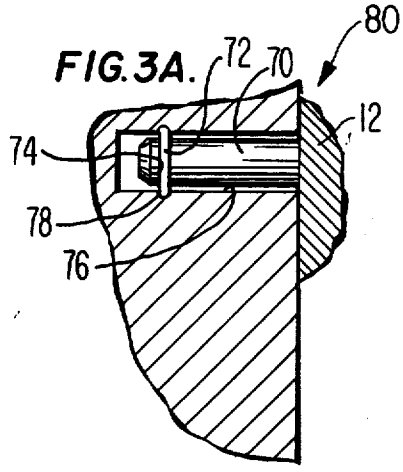


FIG. 3.

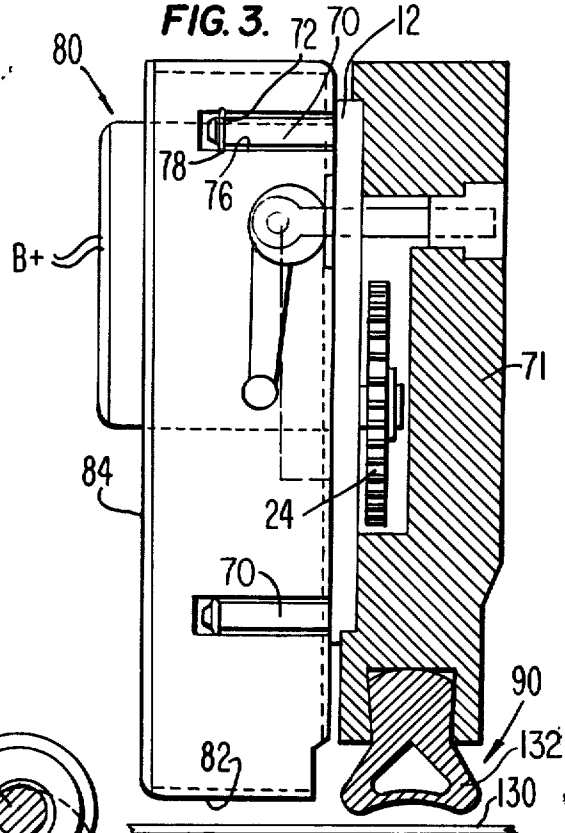
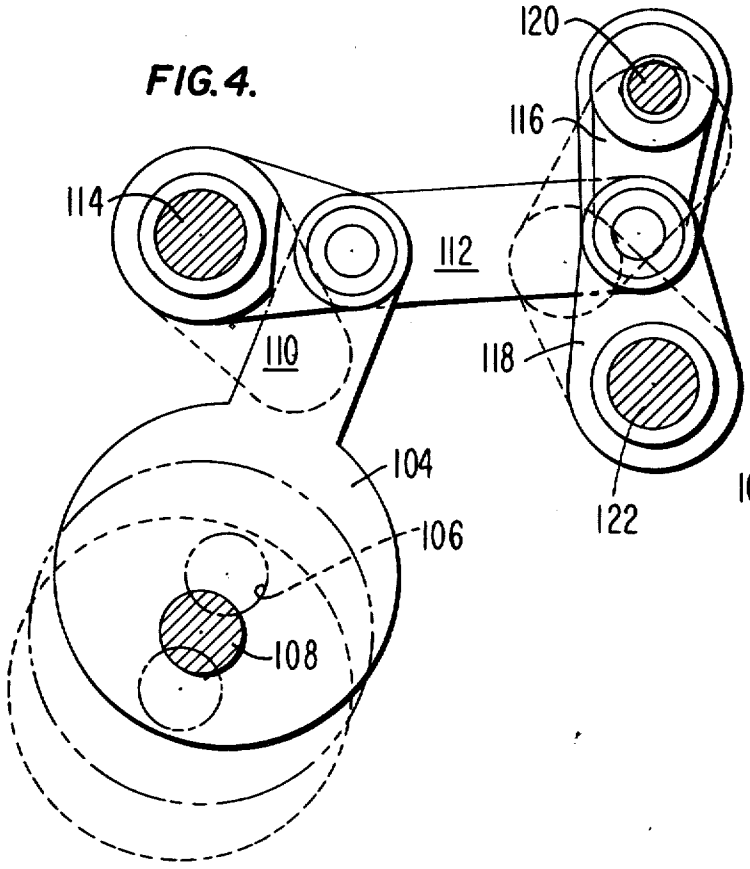
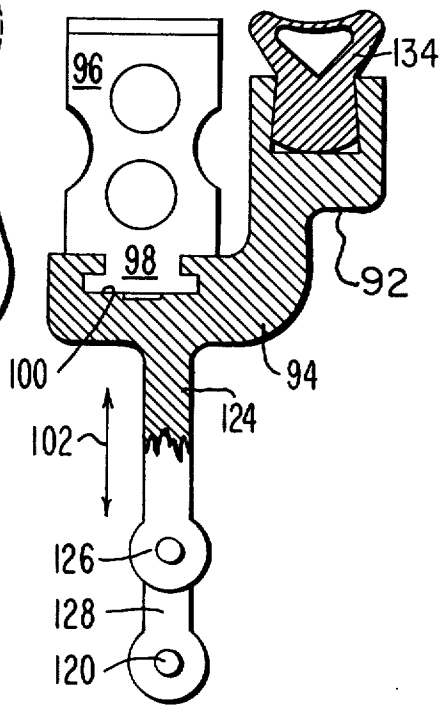


FIG. 4.





DEMOUNTABLE-PLUGGABLE TENSIONING AND RE-INKING RIBBON CARTRIDGE

CROSS REFERENCE TO RELATED APPLICATIONS

The present invention is related to two patent applications entitled "Improved Incremental Feed Device For Advancing Paper Tape, Record Cards and an Inked Ribbon in a Printer," and "Self-Tensioning and Re-Inking Ribbon Cartridge," the former application having been filed on Aug. 31, 1972, and assigned Ser. No. 285,210 and the latter application filed on Oct. 27, 1972 and assigned Ser. No. 301,641 both applications being in the names of Ronald H. Mack and John Bortins and assigned to the assignee of the present invention.

BACKGROUND OF THE INVENTION

A search of the prior art has developed the following U.S. Pat. Nos.: Reissue 27,180, V. Spreter, et al, 2,699,245, G. Hernandez, 2,798,429, F. R. Werner, et al, 2,904,157, H. B. Smith, 2,387,330, C. W. Johnson, 1,547,267, B. M. Shipley, 3,072,053, G. Becker, et al, 3,603,283, F. R. Anderson,

Impact-type printing devices commonly employ inked ribbons for transferring character images from the printing type to the printable media, such ribbons being variously disposed and operably supported in the area of the printing station and commonly in interposed relationship relative to the printing type and the printable media. Such known printing devices generally provide for the arrangement of the inked ribbon in the area of the printing station with the ends of the ribbon anchored to a pair of ribbon spools which are disposed on either side of the station, the inked ribbon being transferably movable between the two spools by a variety of ribbon feed structures such that a fresh area of the ribbon is moved into printing position for the printing of each character image. These particular inked ribbon arrangements, and ribbon feed devices, therefor, are generally characterized by certain operational disadvantages particularly with respect to ribbon removal and replacement. Additionally, known ribbon feed structures have generally been characterized by certain cost disadvantages, particularly with respect to initial manufacturing costs and to subsequent maintenance costs. Such two-spool inked ribbon arrangements have further been characterized by a lack of suitable and effective re-inking means, further contributing to the frequency and inconvenience of ribbon removal and replacement.

Self-contained ribbon cartridges have also been disclosed in the prior art, such as in the Kondur U.S. Pat. No. 3,621,968 also assigned to the Burroughs Corporation, wherein many of the disadvantages of the two-spool ribbon arrangements have been overcome, and wherein internal self-tensioning and re-inking means are provided. Such removably attachable ribbon cartridges are responsive to external ribbon feed means to move the ribbon through a printing position defined thereby. These self-contained ribbon cartridges have generally been characterized, however, by relatively complex internal structures involving a plurality of movable parts such as rotatable rollers and spring-actuated tensioning means, thereby adding to their cost of manufacture and maintenance. Known self-contained ribbon cartridges have further been designed for attachment to the printing device in extrinsic rather than cohabiting relationship to the printing element or elements, thereby contributing little or nothing to the objective of printer compactness.

SUMMARY OF THE INVENTION

A demountable-pluggable ribbon cartridge having self-contained adjustable tensioning and re-inking means is provided with a plurality of ribbon inking rollers operable in conjunction with an inking tension roller and a demountable impact receiving printing matrix, the cartridge being removably attachably engagable with the frame of an associated piece of apparatus such that the printing device is operably disposed adjacent to a reciprocably movable anvil, the adjustable self-tensioning means of the cartridge serving to hold the ribbon in a taut state in a printing position adjacent to the anvil and over the face of the printing matrix and to hold the ribbon in frictional contact with cylindrical re-inking members angled relative to the perpendicular and carrying on their peripheries a deformable porous pre-inked foam material. The inked ribbon in the form of an endless loop is movably disposed within an interior peripheral portion of the cartridge, and braking means is provided comprising an opposing pair of members having discontinuous confronting surface portions between which the ribbon is moved.

It is accordingly an object of the present invention to provide a self-contained pluggably-demountable continually re-inking cartridge.

It is a further object of the present invention to provide a self-contained ribbon cartridge that is both compact in size and suitably long lived to avoid the requirement for frequent replacement.

An important aspect of the invention is the provision in a self-contained ribbon cartridge of multiple pre-inked porous foam inking rollers which provide both drive means and constant inking means.

Another important aspect of the invention is the provision of means integral with the inking cartridge enabling the cartridge to be pluggably mounted and demounted relative to the apparatus with which it is to be associated.

BRIEF DESCRIPTION OF THE DRAWING

These and other objects, advantages and aspects of the invention will be more clearly understood from the following description when read in conjunction with the accompanying drawing, in which:

FIG. 1 is a front elevational view of the novel self-tensioning and re-inking ribbon cartridge;

FIG. 2 is a top plan view of the cartridge printing device of FIG. 1;

FIG. 3 is a side elevational view of the device of FIG. 1 partially in section illustrating the cartridge pluggably engaged with a continuous form bursting device and illustrating a portion of the drive train therefor;

FIG. 3A is an enlarged sectional detail of a portion of the cartridge plug-in element;

FIG. 4 is an enlarged detail view of the drive train for the cartridge inking device as it might be used in a bursting apparatus; and,

FIG. 5 is a schematic view illustrating the structural angular relationship of the three inking rollers relative to the inking ribbon.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention comprises a novel pluggably demountable continuously automatically inking ribbon cartridge for use with printing apparatus such for example as a signature printing or signing device employed with a continuous forms burster. Such apparatus contemplates the employment of a preformed signature plate or panel of metal or plastic material having the desired symbol, name or inscription preformed thereon, e.g. as by etching of metal or casting or forming or extrusion of plastic. The signature plate, characterized as a matrix printing device, is made to be demountably removable so that name, symbol or inscription changes may be easily and efficiently accommodated. In order that the plate may provide a useful, clear, sharp and distinct image regardless of the number of impressions required to be made, an endless inking belt, tape or ribbon is employed with the invention. A plurality of inking and tensioning rollers are utilized so as to replenish automatically the ribbon ink supply during operation of the signing apparatus. The inking rollers are formed of a porous foam material pre-inked with a suitable supply of ink of a desired color and printing consistency. Means is also provided for adjusting the tension on the ribbon since the ribbon tends to stretch laterally and longitudinally during use. In addition, since the ribbon has a tendency to creep slightly or to walk laterally as it progresses through the cartridge a pair of horizontally disposed contiguous inking rollers are angled slightly from the horizontal relative to one another effective trapping the ribbon therebetween and eliminating the "creep" or "walk" of the ribbon.

Referring first to FIG. 1 of the drawing, there is shown a cartridge inking assembly **10** which is illustrated in conjunction with a support member **12**, e.g. the wall or frame of an associated piece of equipment such for example as the burster described and claimed in co-pending application Ser. No. 210,737, filed Dec. 22, 1971, now U.S. Pat. No. 3,794,228 in the names of Richard Colwill et al and entitled "Bursting and Separating Apparatus for Continuous Forms," assigned to the same assignee as the present invention. A set of three shafts **14, 16,** and **18** are mounted for rotation within the body cavity of the cartridge assembly **10** and are arranged in a triagonal cluster as shown in FIG. **1** for purposes to be explained hereinafter. A cover member **20** illustrated as being transparent in the drawing, in production would more likely be relatively hard opaque plastic or metal stock, encloses the front portion of the cartridge assembly **10** sealing out dust, dirt or other foreign matter.

Roller shaft **14** which comprises the drive shaft for the cartridge assembly **10** is preformed with a square cross section **22** and is adapted to be received within the square cross section opening in the driven gear **24.** A transfer gear **26** engagable with gear **24** transfers rotative torque to gear **24** from drive gear **28** secured to shaft **30** of drive motor **32.**

Structurally arranged for conjoint rotation within the cartridge assembly **10** are pre-inked porous foam rollers **34, 36,** and **38.** These rollers **34, 36,** and **38** are pre-inked at the time of fabrication and carry sufficient ink material of the color and consistency desired to accommodate the signing requirements of the particular application.

A continuous loop of ribbon material **40** e.g. one and 1/16 inch wide nylon, etc. 12 inches long capable of receiving ink from rollers **34, 36,** and **38** is adapted to partially encircle rollers **34** and **38** while roller **36** is adapted to press the ribbon **40** in between the other two rollers **34** and **38** a slight distance as seen in FIG. **1.** Roller **36** is biased by spring **42** into peripheral engagement with the surface of rollers **34** and **38** and applies a pre-fixed degree of tension to the ribbon **40** as it travels a serpentine path with respect to rollers **34,** 36, and **38.**

Roller **36** is arranged with its mounting shaft **16** perpendicular or normal to the back frame or wall support member **12.** The shafts **14** and **18** of rollers **34** and **38** on the other hand, are slightly canted or angled from the perpendicular 0.005 inch as shown most clearly in the schematic illustration of FIG. **5.** This slight tilt from the normal of rollers **34** and **38** in combination with roller **36** causes the ribbon **40** to be securely trapped therebetween so as to prevent any tendency on the part of the ribbon **40** to walk or creep laterally or horizontally as the ribbon **40** passes over rollers **34** and **38.**

Demountably secured within cartridge assembly **10** is a matrix signer assembly **44.** Assembly **44** includes a demountably replaceable segment or impression producing signature plate member **46** which is or may be secured to a plate holder **48** by means of, for example, epoxy cement. Plate holder **48** is slidably received on a plate supporting structure or member **50** on projecting tangs **52** by means of U-shaped clamp members or ends **54** of plate holder **48.** The plate support member **50** is bolted or rigidly secured to the cartridge body while the signature plate member **46** once mounted on the holder **48** is retained in place by means of the cover member **20.**

Ribbon **40** is caused to extend across the active, exposed face portion of the signature plate member **46** and is held taut in its passage there across by means of two oppositely disposed guide posts **56** projecting vertically away from the base of the cartridge assembly **10** adjacent to opposite corners of the plate holder **48.**

In order to compensate for the fact that the ribbon **40,** after a period of use, expands or stretches both laterally and longitudinally, due to the repeated crushing blows from the printing anvil **58,** a brake member **60,** FIG. **1,** is provided through which the ribbon **40** is advanced to the signing area. Brake member **60** comprises a pair of rigid block-like members **60A** and **60B** the confronting faces of which are shaped as by molding, cutting, casting, etc., so as to provide interengaging irregular lands and grooves or projections and recesses **62** and **64.** The two rigid members **60A** and **60B** are also provided with elongated slots **66** through which attachment bolts **68** project into the base of the cartridge assembly **10** permitting the gap or space between the irregular confronting faces of the two members **60A** and **60B** to be adjustable. This adjustment compensates for ribbon looseness by creating a desired degree of tightness or drag coefficient on the ribbon **40** effectively maintaining the ribbon **40** in a taut condition as it passes across the face of the signature plate member **46.**

As before mentioned, the novel cartridge of the present invention is adapted to be demountably, pluggably received in interengaging relationship with the associ-

ated equipment with which it is to be employed. To this end, FIG. 3, attachment studs or bolts 70 project forwardly from the support member 12 of the associated apparatus 71. The forward end of each shank portion of each stud 70 is provided with an individual resilient "O" ring 72 formed of rubber, neoprene or suitable resilient deformable plastic, trapped in a groove 74 in the bolt end. Studs 70 are received within corresponding mating openings or orifices 76 in the cartridge structure as seen more clearly in FIGS. 3 and 3A of the drawing. Circular grooves 78 in each orifice 76 permit the studs 70 to be snapped into place so that the cartridge assembly 10 can be rigidly attached but still demountable from the support member 12.

As most clearly seen in FIG. 3, the cartridge of the present invention is intended as a self-supporting independent compact assembly 10 which, if manufactured economically enough, could be a "throw-away" device; that is to say, once the ink has been exhausted from the three inking rollers 34, 36 and 38 the entire cartridge assembly 10 could be discarded to be replaced by a fresh cartridge assembly 10 carrying newly inked ribbon inking rollers 34, 36 and 38.

The illustration of FIG. 1 is largely schematic as is readily apparent since the cartridge as such is not depicted with sidewalls, back and front walls as would in fact be the case in a production item. However, in FIG. 3 there is shown a representative example of a true cartridge 80 similar to what could be manufactured in production. Cartridge 80, as shown, includes a substantially rectangular body shell 82 of suitable dimensional rigidity and size to accommodate the inking mechanism previously herein described. Cover member 84 is secured to the edges of the vertically projecting sidewalls of the cartridge body as by welding, etc. in known fashion or, so as to accommodate changes in signature plates, the cover member 84 may be merely a "snap fit" assembly. In FIG. 1 there is illustrated in schematic fashion drive means 86 for driving the anvil 58 toward and away from the ribbon covered signature plate member 46 in the direction of the arrow 88. The illustration of FIG. 3 depicts the cartridge signer operably associated with a Burroughs Corporation burster apparatus 90, apparatus 71 being the upper hold foot carrier member as described and claimed in the burster application Ser. No. 210,737 previously referred to herein. The lower hold foot carrier member 92 is or may be constructed to provide a platform 94 for demountably engaging anvil member 96 as by the T-shaped base 98 interengaged in the slot 100. Member 92 is adapted to be driven vertically upwardly and downwardly in the direction of the arrow 102 by means of drive cams and linkages associated with the burster apparatus with which the signer and cartridge assembly is operably associated.

Secured to the main drive of the burster apparatus is a casting 104 provided with an eccentric 106 for attachment to the main drive shaft 108. Casting 104 is connected by means of projection 110 in driving engagement with a toggle link 112 attached for rocking movement to shaft 114. The rightwardly extending end of toggle link 112 is movably secured to the inwardly facing ends of toggle links 116 and 118. The opposite ends of links 116 and 118 are rockable on shafts 120 and 122 respectively. Shaft 122 is fixed in position while shaft 120 is adapted to be movable vertically upwardly and downwardly as indicated by arrow 102.

As seen most clearly in FIG. 3, platform 92 also supporting the lower hold foot carrier member 134 is provided with a depending portion 124 terminating in a boss 126 which permits member 92 and shaft 120 to be interconnected by means of coupling link 128.

In operation of the device, it is assumed that motor 32 energized from a source of electrical energy designated B+ in FIG. 1 will be continuously driving the inking ribbon 40 to provide a freshly inked ribbon portion for the signature plate member 46. The burster mechanism is cyclically operated in stop-start fashion whereby the burster hold feet members 132 and 134 are compressed to separate and burst one by one continuous forms 130 such as checks and/or envelopes or letters that are provided to be burst. Assuming that the main drive is energized, the casting 104 will move from the dotted position as shown in FIG. 4 to the full line position causing the platform 94 and of course the burster to present the anvil face of anvil member 96 to the signature plate member 46 now covered by the ribbon 40. As the mechanism is further cycled, the anvil member 96 will cause an impression to be made on form 130 as the form 130 passes through and between the hold feet members 132 and 134 and the signature plate member 46.

There has thus been described a novel automatic ribbon inking system for use with a signing device which in its most useful form is a throw-away unit which can be discarded and replaced after the ribbon 40 and/or the inking rollers 34, 36 and 38 have exhausted their ink supply.

While a particular embodiment of the invention has been shown, it will be understood, of course, that it is not desired that the invention be restricted thereto since modifications may be made, and it is, therefore, contemplated by the appended claims to cover any such modifications as fall within the true spirit and scope of the invention.

What is claimed:

1. A demountable continuous re-inking ribbon cartridge comprising:

a base support member,

a signature plate holder including means demountably receiving a signature plate having an impression producing area thereon operably associated therewith so that said signature plate can be replaced at will,

a continuous ribbon for inking said signature plate,

means for continuously inking said ribbon, said inking means being physically arranged to entrap said ribbon constraining the ribbon against lateral movement, and

braking means for said ribbon, including means for maintaining said ribbon in taut condition over the impression producing area of said signature plate whereby said ribbon is caused to weave back and forth prior to entering the impression producing area effectively regulating the tautness of the ribbon.

2. The invention of claim 1 wherein said means demountable receiving said signature plate includes oppositely disposed slidably engagable clamp members operably interengagable with supporting projections enabling said signature plate to be mounted and removed from said cartridge at will.

3. The invention of claim 1 wherein said braking means includes demountable adjustable members

forming an irregular, non-linear pathway for said ribbon.

4. The invention of claim 1 wherein said means for continuously inking said ribbon includes a triangular cluster of three inking members with one of said inking members being pivotally biased toward the other two inking members to supply tension to the ribbon as the ribbon passes thereover.

5. The invention of claim 4 wherein said cluster of inking members is arranged with two of said inking members angularly offset relative to each other presenting oppositely angled surfaces to said ribbon thereby constraining said ribbon against lateral movement parallel to said offset inking members.

6. The invention of claim 1 wherein said braking means comprises oppositely disposed rigid members having irregularly shaped confronting surfaces to provide a ribbon gap opening.

7. The invention of claim 6 wherein said rigid members are adjustable relative to one another to vary the opening therebetween thus to vary the ribbon gap therebetween and wherein said irregularly shaped confronting surfaces comprise nesting lands and grooves for constraining the ribbon thereby braking the passage of the ribbon therebetween.

8. The invention of claim 1 wherein said continuous re-inking ribbon cartridge is provided with interengagable self-supporting means in press fit relationship with stud means the base support member with which the cartridge is associated for maintaining said cartridge in printing position.

9. The invention in accordance with claim 8 where said interengagably self-supporting means includes at least two oppositely disposed orifices, each orifice having a circular groove for receiving said stud means in telescoping relationship therewith.

10. The invention of claim 8 wherein each stud means carries a resilient O-ring enabling said cartridge to be mountable and demountable at will.

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