Feb. 3, 1959 J. SCHMUTZ 2,871,783

PRINTING ROLL AND STRIP

Filed May 2, 1955

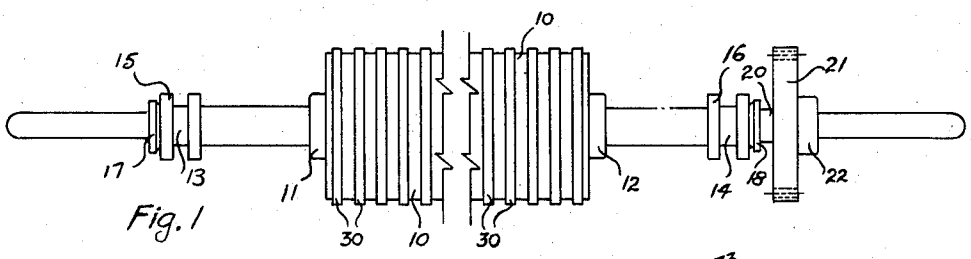


Fig. 1

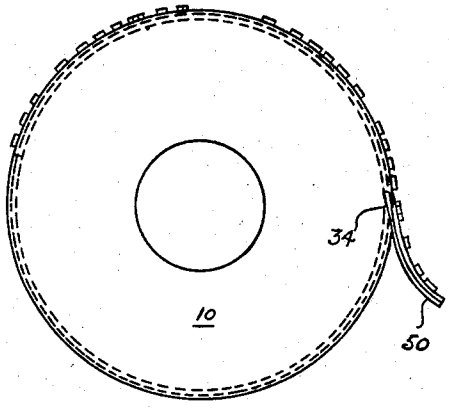


Fig. 3

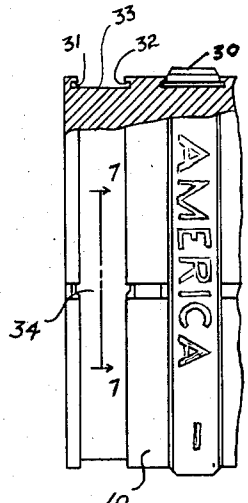


Fig. 2

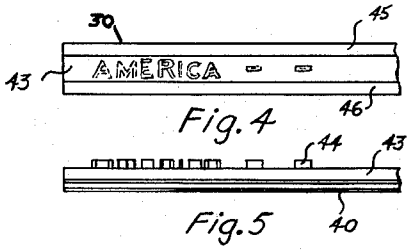


Fig. 4

Fig. 5

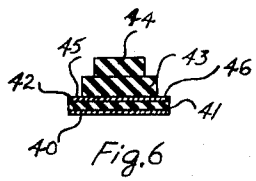


Fig. 6

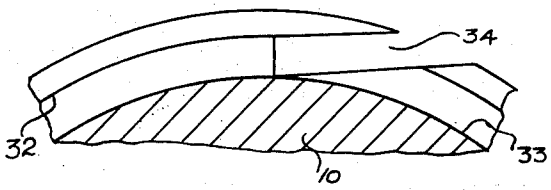


Fig. 7

INVENTOR.
JULIUS SCHMUTZ
BY Arthur Robert
Atty.

United States Patent Office 2,871,783 Patented Feb. 3, 1959

2,871,783

PRINTING ROLL AND STRIP

Julius Schmutz, Glenview, Ky., assignor to Schmutz Manufacturing Company, Incorporated, Louisville, Ky., a corporation of Kentucky

Application May 2, 1955, Serial No. 505,137

6 Claims. (Cl. 101—377)

This invention relates to printing apparatus and more particularly to a novel data printing roll, a novel data printing element or strip and a novel combination of roll and strip. Although the invention is suitable for any general printing purpose, it is especially adapted for printing a flow of material, such as sheet steel, fabrics, plastics, paper or the like, wherein as changes in the specifications of the material occur, a quick change in the data being printed on the flow of material is required.

In the printing of metal sheets, for example, it is conventional practice to employ an elongated data roll or cylinder carrying a series of printing elements which imprint certain data upon the sheets. These elements have to be changed whenever the data which they imprint becomes inappropriate. In many types of printing elements the means employed for anchoring the element to the data roll, and for insuring proper registration of the element, requires the disassembly of the roll for the purpose of substituting another element. Moreover, in many cases it is necessary to remove the roll entirely from its position in printing cooperation with the sheet merely to replace a printing element. These features of conventional rolls, therefore, have the disadvantages of loss of printing time; of requiring skilled labor in replacing a printing element, and of requiring comparatively expensive roll constructions.

Printing elements or strips of the general type disclosed herein have been employed heretofore, but, so far as known, the specific type with the inherent advantages, later to be described, have not been available. For example, it is well known to employ a printing element with a single metal backing serving to prevent stretching, creeping or distortion of the resilient body upon which the printing surface is formed. Such elements are sometimes provided with cushion layers, bonding layers and the like, but the resulting construction when actually employed either as a continuous or discontinuous printing element, and either on an arcuate or a plane surface, requires some other means for anchoring and for adjustment of the printing element.

It has now been found that by employing the particular printing element construction taught by this invention the above disadvantages of former practices may be substantially overcome. While the invention is described in respect to the use of a discontinuous printing element for mounting upon an arcuate roll, it is to be understood that certain features may also be employed in flat surface printing, and with printing elements of endless configuration, such as rings.

It is, therefore, an object of the invention to provide a printing apparatus including an improved printing element having a self-anchoring characteristic.

A second object is to provide a printing element characterized by its ease of interchangeability in a printing data roll.

A third object is to provide a printing element less susceptible to wear and capable of producing an improved printing impression.

Another object is to provide an improved printing data roll.

Various other objects, features and advantages of the invention will be apparent from the following description and from an inspection of the accompanying drawings showing one form of apparatus embodying the invention in which

Fig. 1 is an elevation view of a data roll, showing the mounting of the printing elements.

Fig. 2 is a fragmentary elevation view, partly in section and to a larger scale, showing a printing element mounted in the data roll.

Fig. 3 is an end elevation view of the data roll, showing a printing element partially inserted in the receiving slot.

Fig. 4 is a plan view, showing a portion of a printing element.

Fig. 5 is a side elevation view of the portion of the element shown in Fig. 4.

Fig. 6 is an end view of the element shown in Fig. 4, and to a larger scale, and

Fig. 7 is a partial sectional view, taken on line 7—7 of Fig. 2 and to a larger scale.

The cylinder or data roll illustrated in Fig. 1 may include a hollow roll body **10** consisting of a single casting, for example, or, if desired, of a series of similar shaped discs. For ease of fabrication the body **10** may be centered upon a stepped one piece shaft by means of demountable end spiders **11** and **12** which, when properly adjusted, provide a single rotatable unit. The shaft may be provided with spaced portions **13** and **14**, of reduced diameter, and upon which sealed ball bearings **15** and **16** are seated and held in place by retainer means **17** and **18**. The shaft is further provided with a reduced diameter step **20** upon which a drive gear **21** is held by retainer means **22** and which gear is driven by any suitable prime mover, not shown.

It will be appreciated by those skilled in the art that the bearings preferably are intended to be mounted in spaced stationary frame members, and that the material to be printed, such as a web or separate sheets, will be moved past the rotatable roll with a brief contact against the printing surface of such roll. Without departing from the invention, however, the roll may be made movable with respect to the material to be printed, at the cost of a more complicated and expensive arrangement. Upon the circumference of roll **10**, a series of printing elements **30** are positioned and, as described below, these elements may be readily inserted and withdrawn from the roll without in any way disturbing its assembled condition with respect to the bearings, the drive gearing, or the material to be printed.

Referring now to Fig. 2 the body of roll **10** is shown as having a series of spaced circumferential slots or grooves cut into the periphery of the roll. The slots preferably extend around the entire periphery, although if desired they may extend around only a portion of the periphery. Likewise, if they extend around the entire periphery, it is not necessary that the printing element **30** occupy the entire slot in order to accomplish its intended purpose. As noted at the left hand portion of Fig. 2 the slot is undercut into the body of the roll, leaving undercut ledges **31** and **32**, a bottom surface **33** and spaced side walls. In other words, the roll has an elongate type-anchoring slot extending lengthwise in an arcuate or circular path about the axis of the roll. This slot is of T-shape in transverse cross section with the bar of the T spaced inwardly from the periphery of the roll and with the stem of the T extending from the bar radially outward entirely through the periphery of the roll. At an appropriate location the slot is provided with a radially open, and preferably substantially tangential, aperture or notch **34** extending to the exterior surface of

the roll. More specifically, the roll has an access slot in the form of a branch extension of said type-anchoring slot. The bar portion of the access slot diverges outwardly from said type-anchoring slot to extend from a predetermined point, along the length of said type-anchoring slot, entirely through the periphery of the roll at another point spaced angularly from an axial plane extending radially through said predetermined point. The center of the bar portion of this access slot preferably extends substantially tangentially from its junction with the type-anchoring slot.

As shown in Figs. 2 and 3, the improved printing element **30**, having a form and dimension designed to substantially fill the slot, may, therefore, be inserted into the slot through the aperture **34** and may be completely stored within said slot by continued movement through the aperture. When, however, it is desired to remove the printing element **30**, it must be moved in a reverse direction through the aperture **34**. Fig. 2 also shows a printing element **30** in place within a second slot and indicates the manner in which the element closes the aperture when completely inserted in position.

As shown in Figs. 4, 5, 6, the printing element **30** is elongated and discontinuous, having two ends. A thin, flexible, spring metal base member **40**, adapted to contact the bottom **33** of the slot, has bonded thereto a resilient material **41**, such as rubber, and to this material is bonded a second thin, flexible, spring metal member **42**, thus forming a flexible metal sandwich foundation or composite base for the element **30**. Upon member **42**, a relatively narrow strip of a second resilient material **43**, such as rubber, is securely mounted and its outer surface provided with raised characters **44** preferably of the same material, such characters forming the printing surface of the element. It will be noted that the width of the material **43** is less than the relatively wider member **42** so as to leave the metal margins, wings or bearing surfaces **45** and **46** of member **42** free for contact with the undercut ledges **31** and **32** of the roll when such element is mounted upon the roll **10**. The spaced bearing surfaces thus provided facilitate the insertion and removal of the strip and assist in keeping the element stable transversely, and in proper register, as the roll **10** rotates. In other words, the printing element comprises an elongate strip of material of T-shape in transverse cross section, the bar of the T being in the form of a composite base and the stem of the T presenting a printing surface at its outer end face.

With the thus described construction in mind, reference is made to Fig. 3 showing the element during the operation of mounting the same upon roll **10**. The printing element is insertable and removable endwise into and out of the type-anchoring slot through said access slot. As it is progressively inserted or removed, it flexes along its length to conform to the (type-anchoring and access) slot contour changes which it encounters during such insertion and removal. When the leading edge of the element enters the tangentially open aperture **34**, the top surfaces **45** and **46** contact the inner faces of the ledges **31** and **32** and the printing element on strip **30** is compelled to assume an arcuate shape of a predetermined curvature. However, since the radius of the ledges is different from the radius of the bottom of the slot, the metal base member **40** is compelled to assume an arcuate shape of a slightly different or sharper curvature. As a result the flexible material **41** between metal strips **40** and **42**, is placed under stress along the length of the discontinuous element.

It is noted that, as the printing element **30** is inserted further and further into the slot, its projecting end **50**, which gets smaller and smaller, will curve more and more sharply outward. Apparently, the same type of action takes place when the printing element is entirely confined within the slot. As a result the bottom and top metal surfaces of the strip are forced into engagement with the adjacent surfaces of the roll, and through such frictional engagement, a force is created which anchors the printing element securely at any desired position to which it may be adjusted within the slot.

When the element is completely within the slot, no additional anchoring means, such as is employed in conventional apparatus, is required. The desirable feature thus described is believed to be due in part to the relative proportions of the several components of the printing element. For example, experience has indicated that the thickness of the resilient material **41** should be greater than the thickness of either of the metal members **40** and **42** and should be less than the thickness of the second resilient material **43**. In order to avoid any substantial deformation of the characters **44**, when the printing element is subjected to the stress of mounting, it is desirable to provide a substantial thickness for both the characters **44** and the second material **43**.

In one satisfactory printing element dimensioned 12.0" l. x .825" w. x .375" t. and designed to be used upon a data roll having a diameter of 9.25 inches, the characters **44** were $\frac{8}{64}$ inch (.125") thick; the material **43** was $\frac{12}{64}$ inch (.1875") thick and $\frac{19}{32}$ inch (.625") wide; the metal members **40** and **42**, made of spring brass strips, were each $\frac{1}{64}$ inch (.0156") thick and $\frac{26}{32}$ inch (.825") wide; and the rubber sandwich strip **41** was $\frac{1}{32}$ inch (.0313") thick. As a further advantage of the metal sandwich foundation, in contact with elements having only a single metal strip, it is found that there is no wear upon the foundation for the printing characters and that over a substantial period of time the overall thickness of the element remains unchanged. This results in a uniform printing effect even though the same printing element is frequently removed and reused in the data roll.

It will be noted that the composite base formed by strips **40**, **41** and **42** is thin in relation to the overall thickness of the remainder of the strip, the base and the remainder having a thickness ratio of approximately 1 to 5. By using thin strips **40** and **42**, composed of a springy material such a spring brass, and an interposed layer **41**, composed of soft rubber, a composite resilient base is produced. This base presents roll-engaging metal surfaces at its bottom through bottom metal strip **40** and at its top through the wide margins of top metal strip **42**. As a result frictional resistance between the strip and roll is minimized. It is therefore relatively easy to insert or remove a strip into or from a snug fit within the groove and to move it slideably within the slot to a desired printing position. Once in this position, it should not tend to move as a result of the contacts it undergoes with material being printed. The stresses set up in the base when it curves to conform to the slot apparently has the effect of anchoring the elements in the position to which it is manually moved with sufficient force to resist displacement through printing engagement.

This desirable feature cannot, so far as known, be achieved in articles shown by the prior art in which a single thick metal backing is used, or in which the element is composed entirely of rubber, or in which one of the sliding surfaces in contact with the slot in the roll is made of rubber or the like.

Accordingly, it now will be noted that in operating a data roll such as shown in Fig. 1, all that is needed in order to change an element **30** is to bring the roll to rest with the aperture **34** at an accessible location. Thereafter, the selected element **30** is pulled backwardly through the aperture and the substitute element is moved inwardly into the vacated slot space. This operation is accomplished without dismounting the roll; or moving the material to be printed; or performing any adjustments of separate anchoring means for the printing element. It also will be apparent that in lieu of employing a data roll having a plurality of printing elements

a rotatable means having only a single printing element mounted therein may be used.

It will also be noted that the printing strip can be placed at any desired location in its type-anchoring slot over the entire periphery of the printing roll, including bridging the type-access slot **34** as shown in Fig. 2. This enables a printing strip to be positioned on the roll at any desired location relative to other strips on the roll without regard to the location of the access slot **34.** In addition, a strip may, if long enough, extend around the entire periphery of the roll.

The foregoing description of the invention is intended to be explanatory thereof, but various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

Having described my invention, I claim:

1. A printing element comprising: an elongate strip of material of T-shape in transverse cross section; the bar of the T being in the form of a composite base composed of a flexible springy metal bottom strip, a flexible resilient rubbery center strip secured to the top face of the bottom strip, the top face of the center strip having a longitudinal center portion flanked by longitudinal side marginal portions, and top strip means providing a flexible springy metal top strip extending longitudinally over and secured to each side marginal portion; and the stem of the T being composed of resilient rubbery material secured to and projecting upwardly from the longitudinal center portion of the top face of the composite base leaving the metal side marginal portions of the top face of said base exposed, the outer face of said stem material presenting a printing surface.

2. The element of claim 1 wherein: said top strip means is in the form of an elongate flexible spring metal top strip, the width of which extends across substantially the full width of the top face of the center strip.

3. A printing strip holder comprising: a roll having an elongate type-anchoring slot extending lengthwise in a circular path about the axis of the roll and being of T-shape in cross section with the bar of the T spaced inwardly from the periphery of the roll and with the stem of the T extending from the bar radially outward through the periphery of the roll, said roll also having

an access slot in the form of a branch extension of said type-anchoring slot, the bar portion of said access slot diverging outwardly from said type-anchoring slot to extend from a predetermined point, along the length of said type-anchoring slot, entirely through the periphery of the roll at another point spaced angularly from an axial plane extending radially through said predetermined point.

4. The holder of claim 3 wherein: the center of the bar portion of said access slot extends substantially tangentially from said anchoring slot.

5. A printing device comprising: the printing element of claim 1; a printing strip holder including a roll having an elongate type-anchoring slot extending lengthwise in a circular path about the axis of the roll and being of T-shape in cross section with the bar of the T spaced inwardly from the periphery of the roll and with the stem of the T extending from the bar radially outward through the periphery of the roll, said roll also having an access opening; said printing element being insertable endwise into and removable endwise out of said type-anchoring slot through said access opening and flexing along its length as it is progressively inserted or removed to conform to the contour changes said element progressively encounters in the type-anchoring slot and the access opening during such insertion and removal.

6. The printing device of claim 5 wherein: the access opening of the roll is an access slot in the form of a branch extension of said type-anchoring slot, the bar portion of said access slot diverging outwardly from said type-anchoring slot to extend from a predetermined point, along the length of said type-anchoring slot, entirely through the periphery of the roll at another point spaced angularly from an axial plane extending radially through said predetermined point.

References Cited in the file of this patent

UNITED STATES PATENTS

2,028,709	Swan et al.	Jan. 21, 1936
2,643,609	Gottscho	June 30, 1953

FOREIGN PATENTS

365,690	Great Britain	Jan. 28, 1932
424,072	Great Britain	Feb. 14, 1935