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Albright

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[54] **SELF-TENSIONING PRINTING PLATE SADDLE**

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[52] **U.S. Cl.** **101/415.1**
[51] **Int. Cl.** **B41f 27/06**
[58] **Field of Search** 101/378, 415.1

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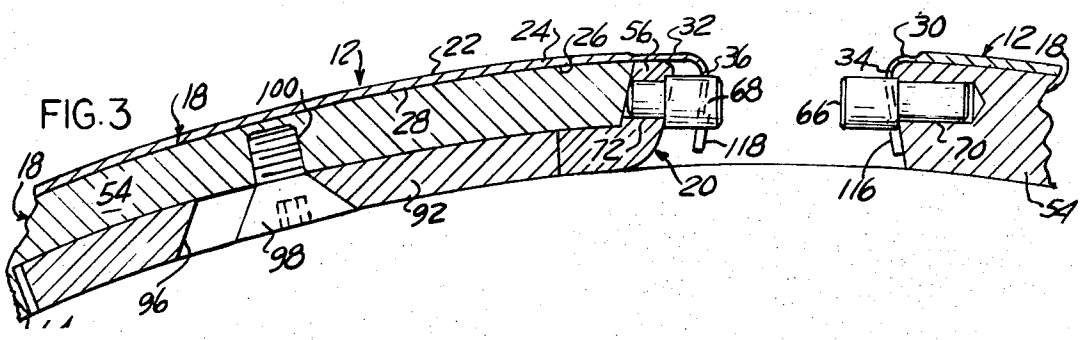
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Primary Examiner—J. Reed Fisher

[57] **ABSTRACT**

A semi-cylindrical adapter shell or "saddle," around which is bent a thin arcuate metal or plastic printing plate, and bolted in pairs to the cylinders of newspaper printing presses to replace the now obsolescent stereotypes, has transversely spaced pins on its opposite ends projecting through holes in the inwardly bent ends or flaps of the printing plate. The pins on the leading end are fixed whereas those on the trailing end are movable by being mounted on a transverse spring-loaded foot bar carried by arcuate guide arms slidable circumferentially in arcuate guide grooves in the saddle and urged circumferentially away from the saddle by springs which tightly stretch the printing plate circumferentially around the saddle in snugly fitting surface-to-surface engagement from end to end of the printing plate. A rotary cam tool insertable in a radial hole in the cylinder in the gap between the adjacent ends of a pair of saddles mounted on the cylinder enables the foot bar to be temporarily retracted during mounting of the printing plate on the saddle.

4 Claims, 7 Drawing Figures



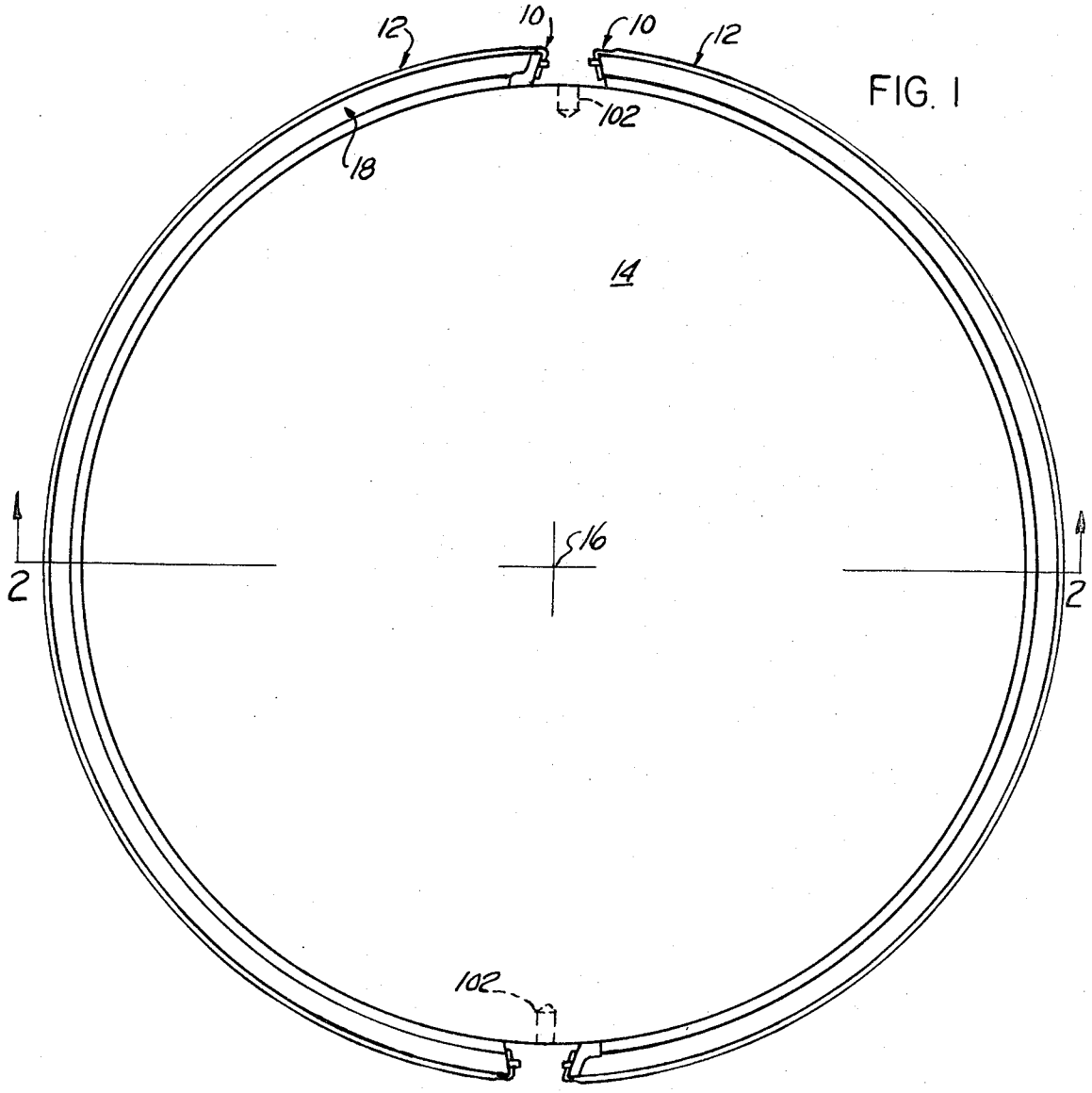


FIG. 1

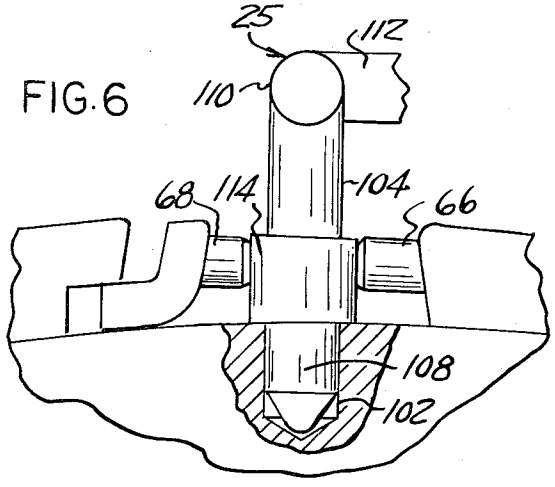


FIG. 6

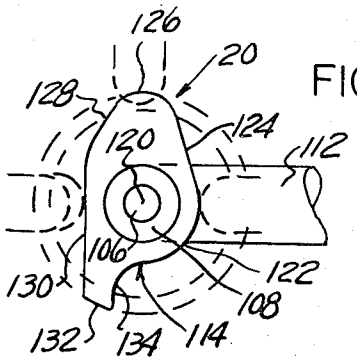


FIG. 7

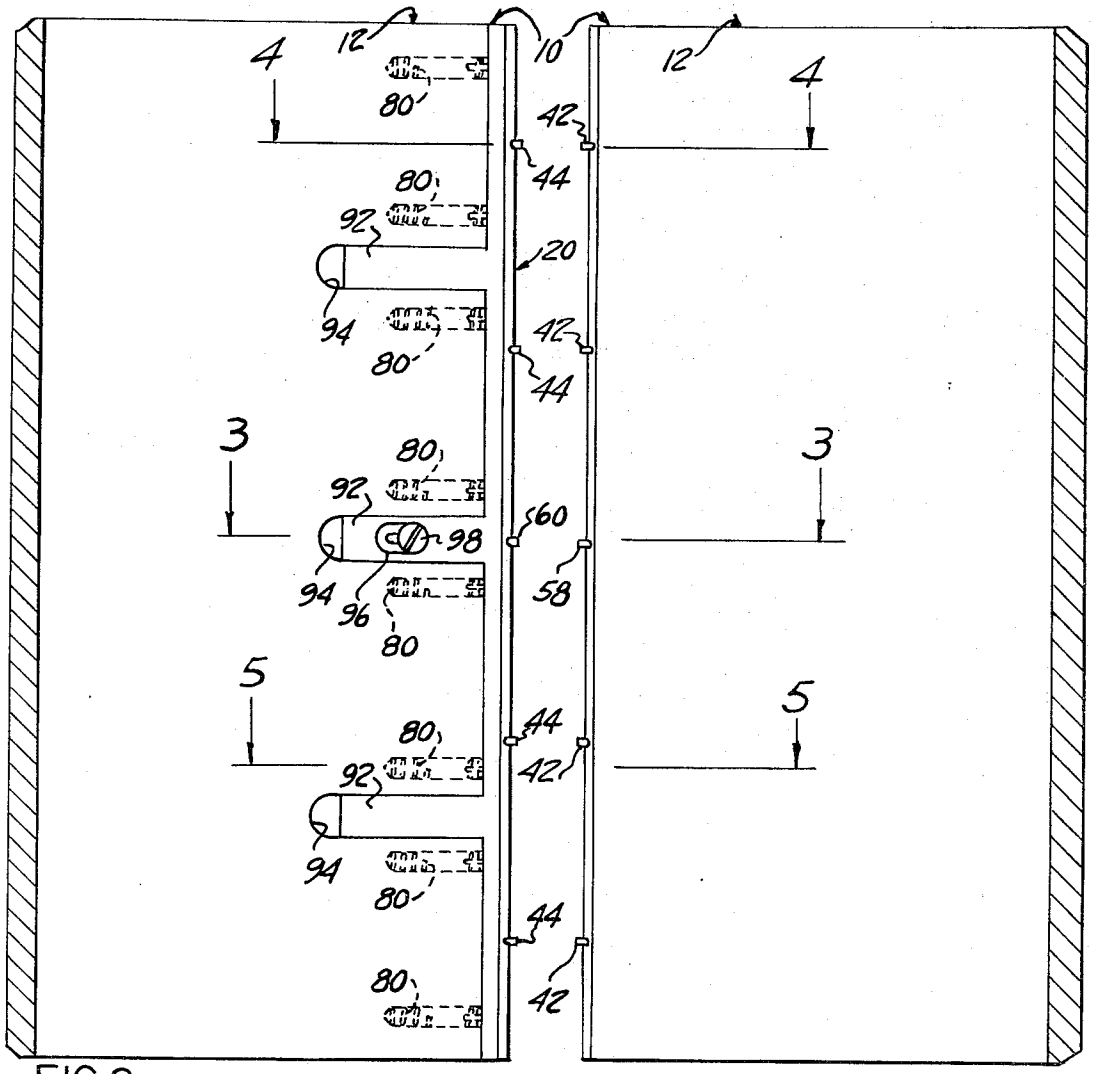


FIG.2

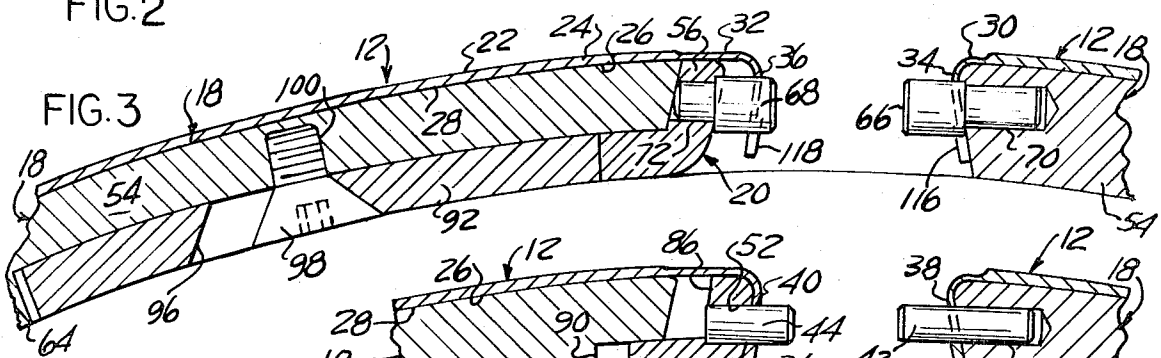


FIG.3

FIG.4

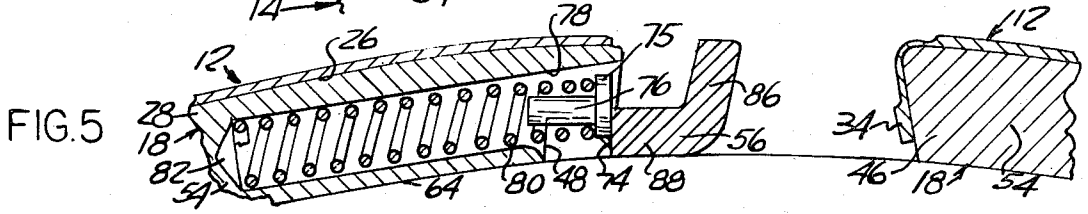


FIG.5

SELF-TENSIONING PRINTING PLATE SADDLE

SUMMARY OF THE INVENTION

The foot bar mounted on the spring-loaded arcuately-sliding guide arms moving circumferentially in their respective arcuate guide grooves in the saddle tightly stretches the printing plate circumferentially around and against the saddle from end to end of the printing plate. This saddle construction prevents flexing of the opposite end portions of the printing plate and also prevents the inking rollers from inking these opposite end portions of the printing plate, which inking otherwise causes smudging of the paper.

BACKGROUND OF THE INVENTION

Cylinder printing presses formerly employed so-called stereotypes consisting of thick cast semi-cylinders with type cast thereon for printing impressions thereof upon paper, especially in newspaper printing. These stereotypes have largely been discarded and replaced by thin metal or plastic printing plates. Many of the presses upon which they were employed are still in use. In order to position the type on the printing plate at the proper radial distance from the axis of rotation of the press cylinder, it has been found necessary to employ semi-cylindrical adapters known as "saddles" to fill in the space between the press cylinder and the thin printing plate previously occupied by the thick stereotype.

Various mechanisms and devices have been previously evolved for securing the printing plate to the saddle but all of these have presented defects or disadvantages which have rendered them more or less unsatisfactory in use. Some of these devices anchored the printing plate to one end of the saddle and secured the other end by tightening screws or springs which pulled that end away from the saddle in a direction tangential thereto. As these prior arrangements pivoted the printing plate around the central portion of the saddle as a fulcrum, thereby leaving gaps between the saddle and the printing plate at either or both ends of the printing plate. As a result of these gaps, the printing plate was caused to flex during its rotation with the saddle and cylinder. Such flexing not only caused fatigue and ultimate breakage of the printing plate but also caused the end portions to be unintentionally inked by the inking rollers, with the result that these end portions, by projecting outward from the saddle, impressed smudged areas on the paper being printed. The present invention, by pulling the ends of the printing plate in a circumferential direction, maintains all portions, including the opposite end portions of the printing plate in snug surface-to-surface engagement with the saddle so that it not only prevents such flexing of the printing plate but also prevents consequent smudging of the paper.

In the drawings,

FIG. 1 is a side elevation of a pair of saddles mounted upon a press cylinder, showing means for stretching the thin printing plates circumferentially thereon, according to one form of the invention;

FIG. 2 is a bottom plan view, partly in longitudinal section, looking upward along the line 2—2 in FIG. 1;

FIG. 3 is a cross-section upon an enlarged scale along the line 3—3 in FIG. 2, showing the abutment pin construction in the central plane of the saddle;

FIG. 4 is a cross-section, also upon an enlarged scale, taken along the line 4—4 in FIG. 2, showing the fixed and movable head and foot plate-anchoring pins upon the leading end and trailing foot bar respectively of adjacent saddles;

FIG. 5 is a cross-section, also upon an enlarged scale, taken along the line 5—5 in FIG. 2, showing one of the tensioning springs and the spring-retaining pin secured to the plate-tensioning foot bar;

FIG. 6 is an enlarged side elevation, partly in cross-section, of the upper central portion of FIG. 1 prior to mounting the printing plate upon the saddle, showing the foot bar retracting device of the present invention in its extended position prior to retraction; and

FIG. 7 is a bottom plan view of the foot bar retracting device, showing diagrammatically the extent of the relative motion imparted to the opposing abutment pins of FIG. 6 by the cam of the retracting device.

Referring to the drawings in detail, FIG. 1 shows in side elevation a pair of printing plate and saddle assemblies, each generally designated **10**, and each including a printing plate **12**. The two assemblies **10** are mounted on the cylinder **14** of a conventional cylinder printing press (not shown) such as is used for printing newspapers and other publications. The printing press cylinder **14** is rotatable around an axis of rotation **16**, and its details are beyond the scope of the present invention. Each assembly **10** includes a printing plate adapter or saddle, generally designated **18**, bolted or otherwise secured to the press cylinder **14** and having the printing plate **12** secured to the saddle **18** by pins described below and tensioned circumferentially thereon by a printing plate tensioner, generally designated **20**, adapted to be retracted by a retracting device, generally designated **25** (FIG. **6**) during installation of the printing plate **12** upon the saddle **18** as set forth in more detail below.

The prining plate **12** is formed of any convenient and suitable bendable material, such as plastic or metal. Such metals include aluminum, magnesium and zinc. The printing plates **12** (FIGS. **3** to **5**) are provided with type faces (not shown) projecting outward from the outer surface **22** of the sheet-like printing plate body **24** which has an inner surface **26** engageable with the cylindrical outer surface **28** (FIG. **3**) of the saddle **18**. The body **24** of each printing plate **12** has thinner leading and trailing end flaps **30** and **32** respectively, the end portions **34** and **36** respectively of which are bent inward during installation and are provided with laterally spaced holes **38** and **40** respectively which are fitted over the correspondingly spaced fixed head pins **42** or movable foot pins **44** at the leading and trailing ends **46** and **48** respectively (FIG. **4**) of the saddle **18**.

The fixed head pins **42** are seated in bores **50** in the end surface **52** of the body **54** of the saddle **18** in a chordal direction, as distinguished from a tangential direction. The movable pins **44**, on the other hand, are seated in bores **52** in a movable foot bar **56** (FIG. **3**), these bores **52** being substantially coaxial with the bores **50** of the head pins **42**. The end surface **58** of the saddle body **54** (FIGS. **3**, **4** and **5**) is inclined slightly inward of a radial plane through the axis of rotation **16** of the press cylinder **14**, which axis **16** is also the center line of the outer cylindrical surface **60** of the press cylinder **14** as well as being the center line of the outer and inner cylindrical surfaces **28** and t4 of the saddle body **54**. This construction causes the saddle body **54** to fit

snugly against the cylindrical outer surface 60 of the press cylinder 14.

The pins 42 and 44 are spaced apart from each other and also are spaced apart from the central plane represented by the section line 3—3 (FIG. 2). Mounted in this central plane are opposing fixed and movable abutment or center pins 66 and 68 respectively (FIGS. 2 and 3) of larger diameter for use with the retracting device 20, as explained below. The pins 66 and 68 have enlarged heads and their shanks are seated in bores 70 and 72 respectively with their axes disposed in chordal directions in a manner similar to that of the bores 50. Welded to the inner edge 74 of the foot bar 56 (FIG. 5) at eight laterally spaced locations with axes parallel to the bores 50, 52, 70 and 72 are the enlarged heads 75 of spring-retaining pins 76. These spring-retaining pins 76 are approximately aligned with chordally directed spring sockets 78 for the reception of printing-plate-tensioning compression springs 60. The inner ends of the springs 80 abut the inner ends 82 of the spring sockets 78 whereas the outer ends surround the spring-retaining pins 76 and abut the inner edge 74 of the foot bar 56.

The foot bar 56 is of approximately L-shaped or angle cross-section with its vertical portion 86 disposed at an obtuse angle slightly greater than a right angle to its horizontal portion 88 (FIG. 4). The horizontal portion 88 slidably engages a recess 90 milled into the inner cylindrical surface 64 of the saddle body 54. The foot bar 56 is carried by three arcuate guide arms 92 secured thereto and guided in a circumferential path coaxial with the axis of rotation 16 of the press cylinder 14 and therefore coaxial with the inner and outer cylindrical surfaces 64 and 62 of the saddle body 54. These three arcuate guide arms 92 extend inwardly from the horizontal bar portion 88 and are slidably mounted in correspondingly located arcuate guide grooves or channels 94. The arcuate guide arms 92 and guide grooves 94 are also coaxial with the saddle surfaces 28 and 64 and therefore coaxial with the axis of rotation 16. The central arm 92 (FIG. 2) is provided with an elongated bevel-sided slot 96 through which a bevel-headed screw 98 extends, with its shank threaded into a correspondingly threaded blind bore 100 in the saddle body 54. The foot bar 56 together with its arcuate arms 92 and compression springs 80 collectively constitute the printing plate tensioner 20.

The foot bar retracting device 25 (FIGS. 6 and 7) is removably inserted in either of two diametrically opposite radial sockets 102 drilled into the periphery of the printing press cylinder 14 (FIGS. 1 and 6). The device 25 consists of a shaft 104, on the reduced-diameter lower end portion 106 of which is rotatably mounted a bearing bushing 108 which engages the side wall of either socket 102. The upper end portion 110 of the shaft 104 is provided with a radial handle or crank arm 112. Mounted intermediate the shaft end portions 116 and 110 is a cam 114 of irregular shape (FIG. 7) for pushing the headed central pins 66 and 68 away from one another in order to permit bending the perforated printing plate flaps 34 and 36 over the correspondingly located head and foot pins 42 and 44. In order that the operation of the central pins 66 and 68 by the foot bar retracting device 25 will not interfere with the application of the flaps 34 and 36 to the pins 42 and 44, the printing plate 12 at its opposite edges is provided with U-shaped cut-out notches 116 and 118 extending inward from the respective opposite edges in the central portions thereof so as to provide clearances for the headed abutment pins 66 and 68 (FIG. 3).

The cam 114 (FIG. 7), proceeding in a counterclockwise direction relatively to its axis of rotation 120, is provided with a circularly arcuate portion 122 centered on the axis 120, a long straight chordal portion 124, a circularly arcuate portion 126 also centered upon the axis 120 but at a greater radial distance therefrom, a short straight chordal portion 128 inclined at an acute angle relatively to the long straight chordal portion 124, a long straight chordal portion 130 inclined at an obtuse angle to the short straight chordal portion 128, a short circularly arcuate portion 132 centered on the axis 120 at the same radial distance as the portion 126, and a partially radial and partially arcuate inwardly directed portion 134 joining the circularly arcuate portion 132 to the circularly arcuate portion 122.

In the operation of the invention, to install a printing plate 12 upon either of the saddles 18, the operator first applies the perforated flap 34 to the head pins 42 by bending the flap 34 over the leading end 58 of the saddle body 54 with the pins 42 extending through the flap perforations. He then bends and stretches the printing plate 12 around the cylindrical outer surface 28 of the saddle body 54 until the opposite flap 36 comes adjacent to the foot bar 56. He then inserts the lower end portion 108 of the retracting device 25 into the adjacent cylinder socket 102 with the narrowest part of the cam 114 between the straight portions 124 and 130 in the gap between the opposing abutment pins 66 and 68 (FIGS. 6 and 7) and rotates the device 25 by means of the handle 112. The consequent rotation of the cam 114 brings the wider part of the cam 114 between the straight portion 128 and the arcuate portion 122 into engagement with the fixed and movable abutment pins 66 and 68, pushing the abutment pin 68, and with it the foot bar 56, toward the adjacent end of the saddle body 54. This action compresses the tensioning springs 80 and widens the gap between the abutment pins 66 and 68 sufficiently for the flap 35 to be bent downward over the foot pins 44 with the latter entering its perforations.

The operator then reversely rotates the retracting device 25 until the narrowest part of the cam 114 between the straight portions 124 and 130 engages the abutment pins 66 and 68, with the foot bar 56 meanwhile moving outward away from the saddle body 54 under the urge of the compression springs 80. In so doing, the saddle bar 56 and the foot pins 44 thereon move in a circumferential path centered at the axis of rotation 16 of the cylinder 14, thereby causing the trailing end of the printing plate to move into a taut condition in a circumferential direction so that the lower surface 26 of the printing plate 12 snugly engages and slides along the outer surface 28 of the saddle body 54 in face-to-face contact without any gaps or clearances therebetween. As a result, in the subsequent operation of the printing press, the inking rollers ink only the type face portions of the printing plate 12 and remain out of contact with the end portions thereof adjacent the flaps 34 and 36. Consequently, no flexing of the opposite end portions of the printing plate 12 can occur, no fatigue of the metal thereof arises, and no smudges appear on the paper opposite the end portions of the printing plate 12.

The body 54 of the saddle 18 may be made of any suitable material, but material which has the same coef-

ficient of thermal expansion as the press cylinder **14** is preferred, so that differential expansion between the saddle and the press cylinder is substantially eliminated. Thus, the use of a steel saddle of the same coefficient of expansion as the press cylinder prevents the difficulties caused by the differential expansion which occurs when aluminum, magnesium or plastic saddles of different coefficients of expansion are used.

The springs **80** are made of stainless steel, which renders them impervious to corrosion. A compression spring formed of piano wire having a diameter of 0.035 inches exerts 100 pounds of pull upon the printing plate. The use of a multiplicity of such springs enables the tension of the foot bar **56** upon the printing plate **12** to be adjusted according to the particular material of which the printing plate **12** is constructed. Thus, a plastic printing plate requires much less tension than a zinc plate, hence some of the springs **80** can be removed from their sockets **94** when such lighter material printing plates are being used. In other words, the number of springs **80** is varied in order to vary the pull exerted on the particular printing plate.

The saddle body **54** is constructed of an alloy steel, centrifically cast in the form of a tube. After casting, the steel tube is "stress relieved" and then cut into suitable lengths, normally 30 inches long. The inner and outer sides of this tube are on a lathe. The inside surface is turned to exactly the outside diameter of the press cylinder upon which it is to be used. The outside surface is turned to a size 15 thousandths larger than that finally required. Before removing the tube from the lathe, its opposite ends are beveled to suit the clamps on the cylinder upon which the saddles are to be used. The tube is then stress relieved again in a furnace to stabilize the material. Next it is cut length-wise to form two semicylindrical halves. Following the splitting of the tube, the edges are finished as described above and shown in the drawings.

The "saddle" described above and shown in the drawings achieves the following advantages believed to be new and very useful:

a. - It is strong and durable and extremely simple in design and operation.

b. - Being of steel it expands and contracts equally with the steel cylinder as operating temperatures change. This permits the saddle to either be clamped or screwed permanently to the cylinder.

c. - It accommodates a wide variety of plate materials having varying characteristics.

d. - Since the arcuate arms of the foot bar slide circumferentially in the arcuate channels in the inner surface of the "saddle", the plate remains constantly circumferential to the outer surface of the "saddle" at all times, by reason of the fact that the bar thus travels in a circumferential arc.

e. - The center pins at both ends of the saddle assure accurate mounting of each plate for close registry thereof.

I claim:

1. A self-tensioning saddle for holding a flexible printing plate and adapting it to conventional printing press cylinder rotatable around an axis of rotation, said saddle comprising

a saddle body of partially cylindrical extent having circumferentially spaced leading and trailing ends and having cylindrical outer and inner surfaces of curvatures adapted to be coaxial with the axis of rotation of the press cylinder and with said inner surface having a curvature adapted to mate with the cylindrical outer surface of the press cylinder,

means at one end of said body for securing one end of the printing plate thereto,

said body having parallel elongated circularly arcuate guideways therein adjacent the other end of said body and of curvatures coaxial with the outer and inner surfaces of said body,

elongated arcuate guide members of curvatures mating with the curvatures of said guideways arcuately slidable in said guideways in a direction circumferentially of said body,

means for retaining said arcuate guide members in arcuate sliding engagement with said arcuate guideways,

a cross member secured to said guide members adjacent said other end of said body and movable in a circumferential path with said guide members towards and away from said other end of said body,

resilient means on said body resiliently urging said cross member away from said body,

and means on said cross member for securing thereto the other end of the printing plate.

2. A self-tensioning saddle, according to claim **1**, wherein said cross member is of approximately L-shaped cross-section and has a horizontal portion and an approximately vertical portion disposed at obtuse angles relative to one another.

3. A self-tensioning saddle, according to claim **2**, wherein said one end of said body has an end surface disposed at an acute angle to a tangent at its junction with said outer surface, and wherein said vertical portion of said cross member has an inner surface disposed at an obtuse angle to said horizontal portion and abuttingly engageable with said acute-angled end surface.

4. A self-tensioning saddle, according to claim **1**, wherein said retaining means includes one of said guide members having a circumferentially-disposed arcuately-extending guide slot therein and also includes a headed fastener which has a head guidedly engaging said one guide member and which has a shank that extends through said slot and is seated in said body.

* * * * *