United States Patent [19]

Germann

[11] **3,750,571**

[45] **Aug. 7, 1973**

[54] **PLATE CLAMPING DEVICE FOR INTAGLIO PRINTING PRESSES**

[75] Inventor: **Albrecht Germann,** Wurzburg, Germany

[73] Assignee: **Schnellpreasenfabrik Koenig & Bauer Aktiengesellschaft,** Wurzburg, Germany

[22] Filed: **Aug. 3, 1971**

[21] Appl. No.: **168,541**

[30] **Foreign Application Priority Data**

Feb. 6, 1971 Germany ..... P 21 05 633.7

[52] **U.S. Cl.** **101/415.1**

[51] **Int. Cl.** **B41f 27/10,** B41f 27/12

[58] **Field of Search** 101/415.1, 378

[56] **References Cited**

UNITED STATES PATENTS

2,820,409	1/1958	Johnson	101/415.1
3,384,014	5/1968	Berg	101/415.1
838,512	12/1906	Wagner	101/415.1
629,916	8/1899	North	101/415.1
2,961,951	11/1960	Nitchie	101/415.1

FOREIGN PATENTS OR APPLICATIONS

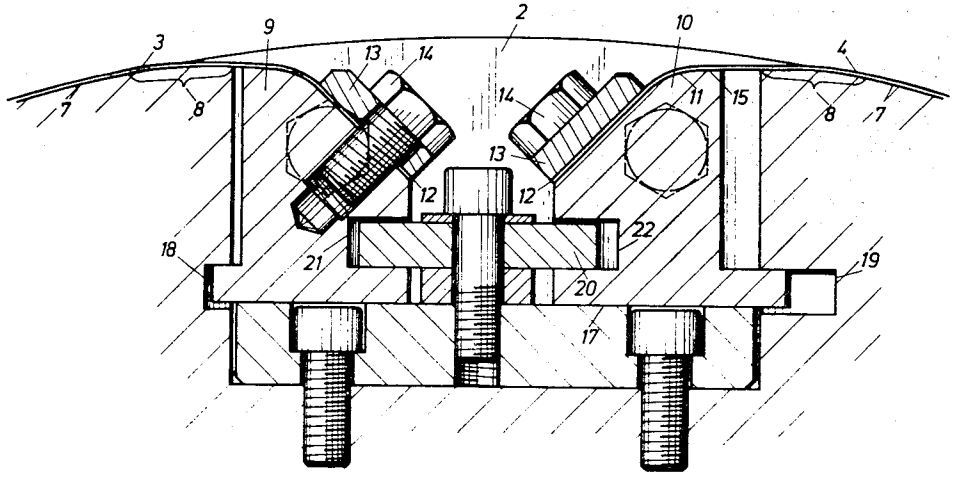
764,560	12/1958	Great Britain	101/415.1

Primary Examiner—William B. Penn
Assistant Examiner—William Pieprz
Attorney—Jones & Lockwood

[57] **ABSTRACT**

A clamping system is provided for tightening printing plates on a form cylinder of an intaglio printing press to avoid plate ruptures. Adjacent the sides of the grooves in the cylinder in which the leading and trailing ends of the plates are clamped, the cylinder is formed with a convex transition curve over which the ends of the plate are led and this transition curve has a curvature which curves the plate such that it does not exceed the elastic limit of the plate and the plate fits snugly around the cylinder surface, thus the tension force that is applied to the plate end does not act on this transition portion of the plate such that it deforms it. Clamping bars for the leading and trailing ends of the plates are slidably mounted in the grooves. There is a clamping strip having screws mounting it on the clamping bar and under which the end of the plate is clamped to the bar. Each clamping bar has a convexly curved surface portion in its upper portion joining at its upper end with a flat surface portion thereon lying in a plane extending tangentially to the radius of curvature of the convexly curved portion and adjacent the convex curved portion on the cylinder so as to receive and direct the end of the printing plate into the cylinder groove and a portion to lie in the plane as a straight line portion as it leaves the transition portion of the cylinder. The clamping bars for the trailing edge are divided into segments and each has a pressure adjusting screw acting on a spring pressing against a wall of the groove. A compression spring is positioned between the clamping bar for the leading edge and each clamping bar segment for the trailing edge of the plate and moves the clamping bars into their initial position. An adjusting screw is mounted in the clamping bar for the leading edge, and it acts against an adjacent wall of the grooves. The clamping bars are slidably secured in the grooves by securing bars.

4 Claims, 4 Drawing Figures



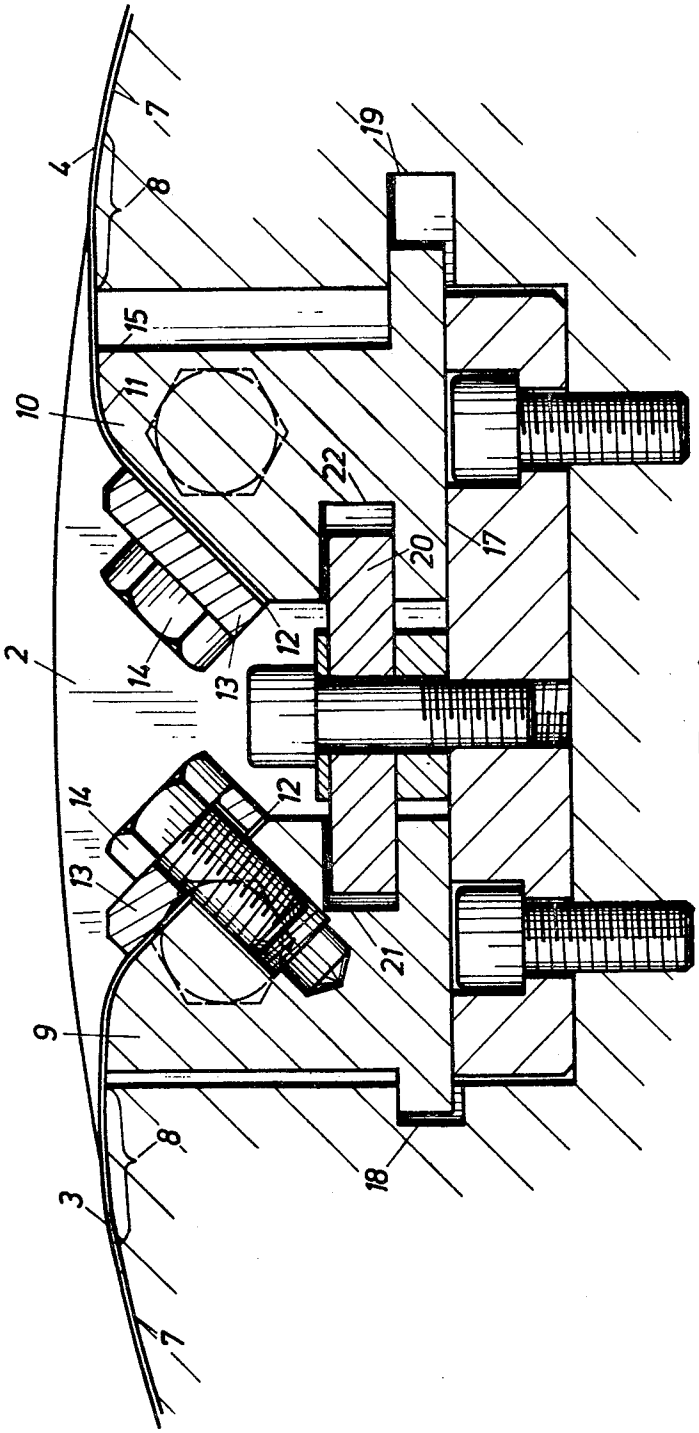


Fig. 1

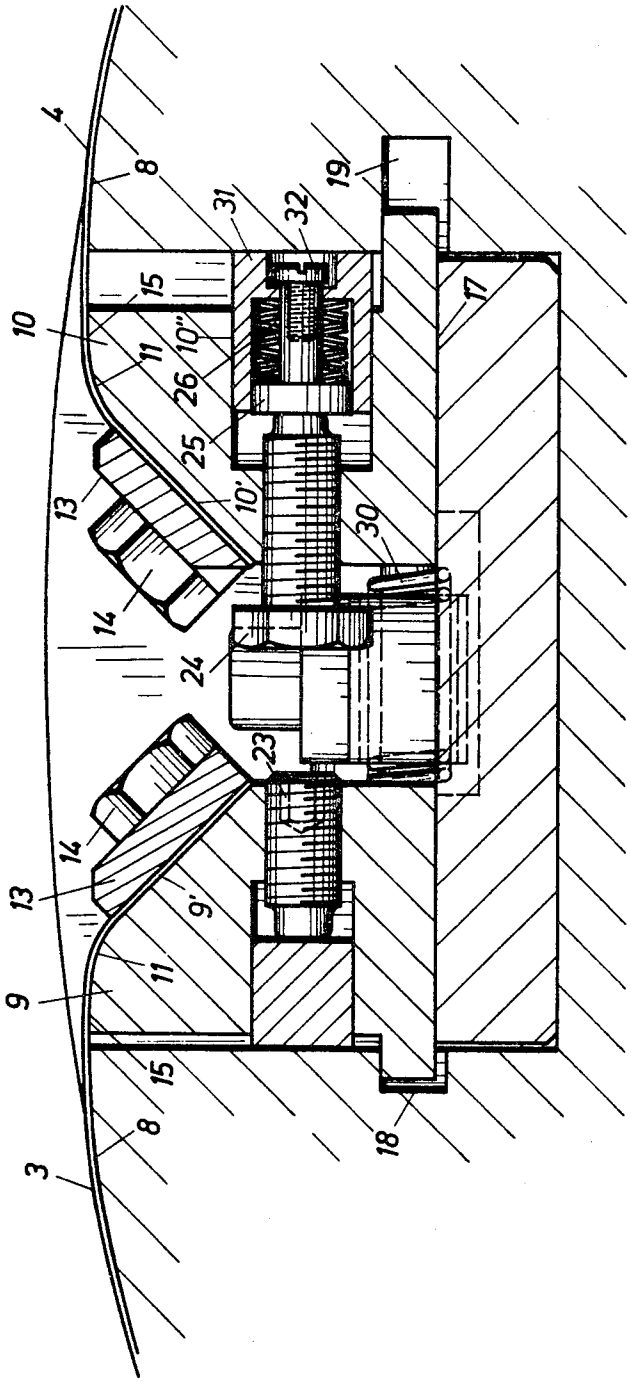


Fig. 2

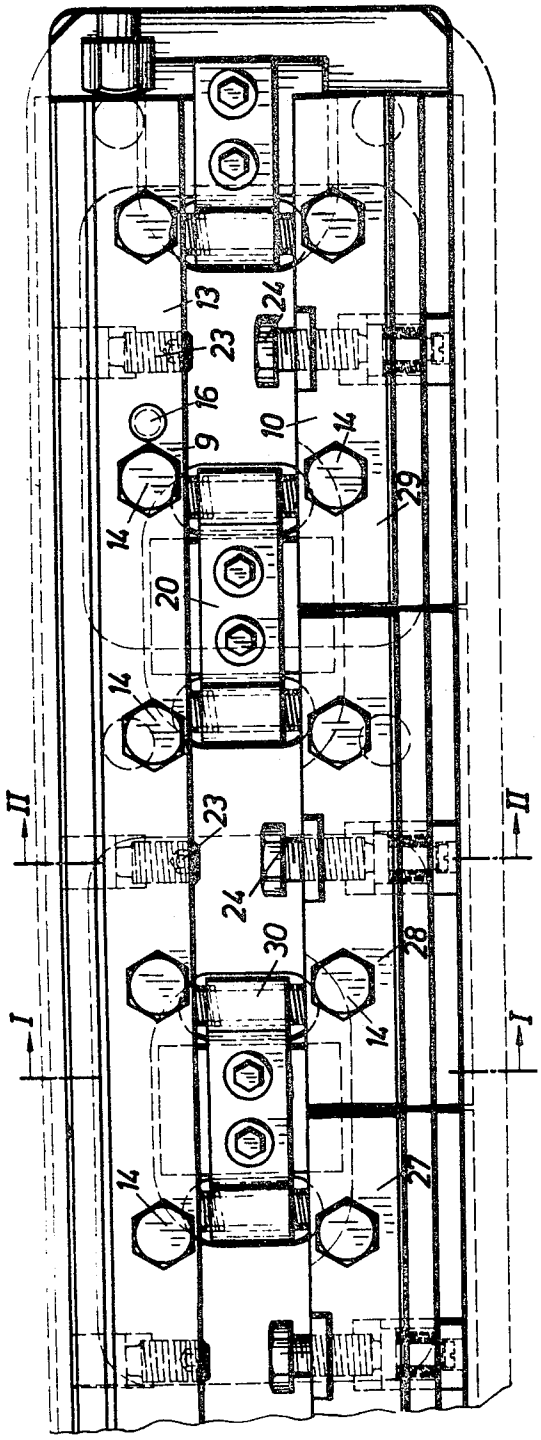


Fig. 3

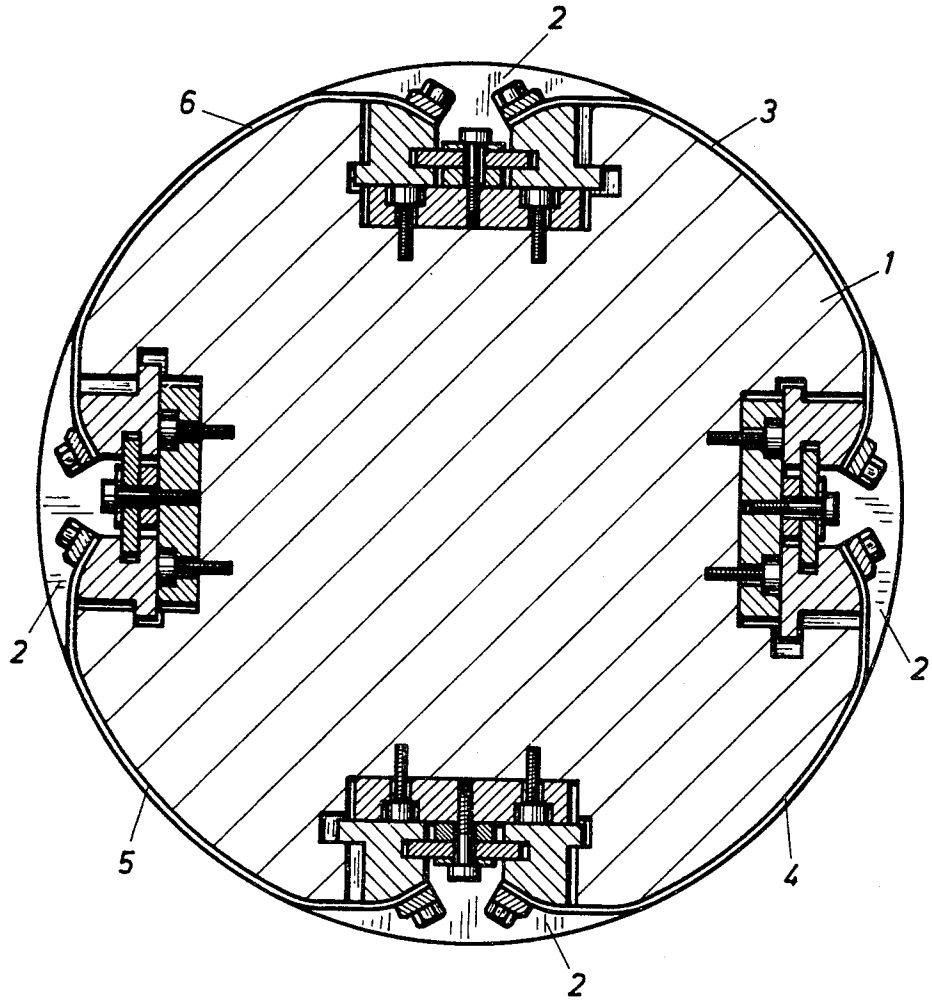


Fig. 4

PLATE CLAMPING DEVICE FOR INTAGLIO PRINTING PRESSES

BACKGROUND OF THE INVENTION

The invention relates to a device for clamping and tightening printing plates on the form cylinder of an intaglio printing press.

Devices of this kind are known somewhat as shown in U.S. Pat. No. 3,154,012 to H. Fisher. For clamping purposes the printing plates are bent on such devices with a relatively small radius of curvature and fastened on a clamping bar by means of clamping screws. The plate ends are tightened whereby the direction of tensile strength is parallel to the plate ends. The plates have a high stability to retain their shape and are very rigid and of material such as top-resistant chrome-nickel steel.

The known devices often cause quite a number of troubles. Firstly, it is necessary that the plates are pre-bent accurately to size. Secondly, the bent edge is stretched when the plate is tightened and a new angle is formed by the edge between the cylinder surface and cylinder groove. Close to the bent edge the printing plate is thus subjected to bending stresses which prevent the plate from resting tightly on the cylinder surface in the vicinity of the bent edge. In case it should be necessary to move the plate when making register adjustments, The new angle formed in the plate comes to rest on the cylinder surface adjacent the cylinder groove either at the leading or trailing edge of the plate. Owing to the high stability of those plates to maintain their shape, the sharp curvature of the plate resting on the cylinder surface cannot be completely stretched so for that reason there is a hollow space between the cylinder surface and the plate. Due to this hollow space the life of a plate is very considerably reduced. Thirdly, in the previously known clamping method the clamping screws have to assume the entire tension load. This causes a waviness of the plate because the clamping power is very much smaller in the plate areas between the screws than in the immediate vicinity of the screws. The plates can yield to the tension load area-wise and warp.

The fourth difficulty is produced at the trailing edge of the plate because the plate is subjected to a fulling effect under the high pressure exerted with machines of this type. If the trailing edge as well as leading edge of the plate are rigidly clamped, the plate which has been lengthened by the fulling effect cannot give way and yield. Owing to this the trailing portion of the plate is also forming a hollow space on the forme cylinder. Besides the linear extension there is also an increase in width toward the trailing edge of the plate. Being firmly clamped there is no possibility for the plate to extend so that in the lateral direction there are also wavelike deformations which are in addition under compressive stress if the impression cylinder is rolling over them.

Due to the considerable deformations at the bent edge, very high tension loads are developed when tightening the plate and adjusting the register. Therefore the correct position of the plate under a normal and firm tension cannot be found until the clamping screws at the leading and trailing edge of the plate have been alternately operated several times.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a device by

means of which it is possible to avoid plate ruptures due to the presence of a hollow space. Furthermore this device will facilitate the registering of the printing plate by means of the clamping screws arranged at the leading edge of the plate.

According to the invention the problem is solved by providing that the printing plate is guided from the surface of the forme cylinder over a transition curve the curvature of which does not result in the elastic limit of the printing plate being exceeded and from there the plate extends in a straight line to a curved clamp bar which for clamping purposes is movable parallel to the straight-line portion of the printing plate and the clamp bar for the trailing edge of the plate is subdivided into several sections and the pressure screws of which that are generating the tension in the printing plate are acting on spring-loaded bolts.

Furthermore, between the clamp bars for the leading and trailing edge of the plate there are compression springs which move the clamp bars into their initial position before plating up. The clamp bar for the leading edge of the plate is provided with two register pins by means of which the printing plate can readily be positioned almost in exact register before clamping.

The device according to the invention provides that the printing plates fit snugly around the cylinder surface at the leading edge as well as at the trailing edge of the plate so that the plates do not spring during the printing cycle and there is thus eliminated the danger of rupture and the cylinder surface as is is not subjected to the formation of pittings. Furthermore the plate can be registered by varying the position of the clamp bar for the leading plate edge because the tangential forces are considerably smaller as the big deformations at the edge of the cylinder groove are avoided.

In making an adjustment the clamping screw at the leading plate edge is loosened thus permitting the plate to be moved by action of the compression spring at the trailing plate edge. An embodiment of the invention is hereinafter described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-section on line I—I of FIG. 3 through the cylinder groove on an enlarged scale

FIG. 2 is a cross-section on line II—II through the cylinder groove on an enlarged scale,

FIG. 3 is a top view of the same, and

FIG. 4 is a cross section through the plate cylinder.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Plate cylinder 1 is provided with cylinder grooves 2. The printing plates 3 through 6 are fastened on the cylinder. In the range of impression the plates are resting on the cylinder surface. As transition to cylinder groove 2 there is a transition curve portion 8. This transition curve portion 8 is convex having one end portion adjacent the cylinder groove sloping into the cylinder groove and over which the ends of the plates 3 and 4 are led, the other end of this convex transition curve portion lies in a common tangent to a radius of the form cylinder and joins with the cylinder surface. This transition curve 8 curves the plate led thereover such that the elastic limit of the plate is not exceeded and the plate fits snugly around the cylinder surface. Clamp bar 9 is the clamp bar for the leading plate edge and clamp bar

10 for the trailing plate edge. According to a curvature 11 the clamp bars 9 and 10 respectively are convexly shaped at the upper surface portions facing plates 3 and 4 respectively so that on the plates edge 12 is pointing into the cylinder groove 2. The clamping bars 9 and 10 have the convexly curved surface portion 11 in their upper portion and there is a flat surface 15 at the upper portion of the bars that lies in a plane extending tangentially to the radius of the convexly curved surface portion 11. Plate edge 12 is secured between clamping strip 13 and a flat surface 9' and 10' on the respective clamp bars 9 and 10 by the clamping screws 14. The plate edge 12 is provided with register holes which can also be shaped as slots open toward plate edge 12 for receiving the clamping screws 14 which have a threaded fit into the register holes fixed in clamp bar 9.

The clamp bars 9 and 10 are movable on a surface 17, guided in the grooves 18 and 19 respectively and furthermore are held in position by plates 20 which engage with or extend into the groove 21 and 22 of the clamp bars 9 and 10 respectively. There are pins 16 in the grooves which cooperate with apertures in the clamp bars for initial alignment of the same. The clamp bar 9 can be moved on the surface 17 by a screw 23 and the clamp bar 10 by a screw 24. Surface 17 runs parallel to the surfaces 15. Screw 24 acts on a movable bolt 25 which is under the tension of the springs 26. Both the bolt 25 and spring 26 are received in a bushing 31 which slides in a recess 10'' in clamp bar 10 on an axis parallel to surfaces 15 and 17. Bushing 31 has a smaller bore in the opposite end separated by an apertured wall from the bore receiving bolt 25 and spring 26. A cap screw 32 is threadly received in the end of bolt 25 that extends through the apertured wall and can reciprocate in the smaller bore of bushing 31.

Curvature 8 is of such an extent that the plates 3 and 4 respectively tightened over it are only stressed in their elastic range even if high tension loads are applied. Therefore it is merely necessary to prebend the printing plates 3 and 4 respectively according to curvature 11 of the clamp bars before securing them on the cylinder. Due to a plate bending in conformity with the curvature, the necessary clamping power is lower than the tension load involved so that any deformations of the plate edges 12 will be negligible. In other circumstances these deformations are to be expected with high loads because the clamping effect of clamp strip 13 upon the printing plate in the area between two clamping screws 14 is smaller than in the vicinity of the clamping screws.

The printing plates can be registered by turning the screws 23 because the compression spring 26 is acting via bolt 25 and the screw 24 on clamp bar 10 and thus to the trailing plate edge which is displacing the end piece resting on cylinder surface 7 according to the way of adjustment of screw 23.

During the printing cycle the plate is rolled out in the line of pressure and experiences thus an elongation which can be compensated by the clamp bar 10 because it is under the action of the springs 26. Over the length of the plate cylinder 1 the clamp bar is divided into several sections 27 to 29 thus permitting the plate end to extend laterally and width wise when subjected to printing pressures during the printing cycle.

Furthermore, the clamp bars 9, 10 are under the action of the springs 30 which move the clamp bars into their initial position when mounting a new plate.

With an intaglio printing press utilizing the clamping system according to this invention, the plate segments are considerably longer than the impression segments of the impression cylinder in order to guarantee that the leading and trailing part of the impression are not within the radii of curvature 11 of the clamping bars.

What is claimed is:

1. A system for clamping and tightening printing plates on a form cylinder of an intaglio printing press, comprising a form cylinder, printing plates on the cylinder, said cylinder having circumferentially spaced apart cylinder grooves in which extends for securement the leading end of one and the trailing end of another of the printing plates and a convex transition curve portion adjacent the sides of the cylinder groove having one end portion adjacent the cylinder groove sloping into the cylinder groove and over which the ends of the plates are led, the other end of said convex transition curve portion lies in a common tangent to a radius of the form cylinder and joins with the cylinder surface, said transition curve having a curvature which curves the plate such that the elastic limit of the plate is not exceeded, and the plate fits snugly around the cylinder surface, slidably mounted clamping bars in the cylinder grooves having means thereon for securing respectively thereto said leading and trailing ends of the plates, each clamping bar having a convexly curved surface portion in its upper portion joining at its upper end with a flat surface portion thereon lying in a plane extending tangentially to the radius of curvature of said convexly curved surface portion of said clamping bar and adjacent said convex transition curve portion on the cylinder, said one end portion of the transition curve portion adjacent the cylinder groove lying in said plane extending tangentially to said radius of curvature of said clamping bar each said clamping bar receiving and directing the end of the printing plate into the cylinder groove, said printing plates being very rigid and of high stability and having a portion of their ends prebent to conform to said convexly curved surface portion of the clamping bars, said printing plate ends extending over said upper flat surface portion of the clamping bar as a straight-line plate portion and lying in said plane that is tangent to the radius of the clamping bar and thence on to where they lie in said convex transition curve portion of the cylinder, each clamping bar being slidably mounted in the cylinder groove on a mounting that is parallel to said flat surface portion in its upper portion whereby said plate as it leaves said curved portion of the cylinder lies in said plane and extends in a straight-line portion as said clamping bar is moved for clamping purposes, said convex curved surface portion of the clamp bar moves parallel to the straight-line portion of the printing plate, the clamp bar for the trailing plate edge being subdivided into a plurality of sections, and each section having a spring bias means between it and said cylinder groove, a pressure screw means mounted on said clamping bar for the leading end of a printing plate and acting against a wall of its mounting groove in the cylinder, and a pressure screw means mounted on said clamp bar for the trailing plate and acting on said spring means for generating a tension in said printing plate, whereby the spring bias means for each clamping bar section for the trailing plate edge maintains the printing plate in its tightened position in spite of the fulling effects and avoids an overtensioning due to wrong handling.

2. A system according to claim 1 including between the clamp bars in each respective groove a compression spring which moves the clamp bars into initial position before plating up and wherein each pressure screw means allows its clamping bar to move to follow the shape and expansion of its plate.

3. A system according to claim 1 wherein the clamping bar for the leading plate edge and the groove have cooperating pin and aperture means for initial alignment of that bar in the groove.

4. A system according to claim 1 wherein in the press utilizing the clamping system, the plate segments are considerably longer than the impression segments of the impression cylinder in order to insure that the leading and trailing part of the impression arenot within the radii of said convexly curved surface portion on the clamping bars.

* * * * *