Jan. 25, 1966 M. ACHINGER ETAL 3,230,883

PRINTING PRESS PLATE CLAMPING MECHANISM

Filed Sept. 30, 1963 3 Sheets-Sheet 1

FIG.1.

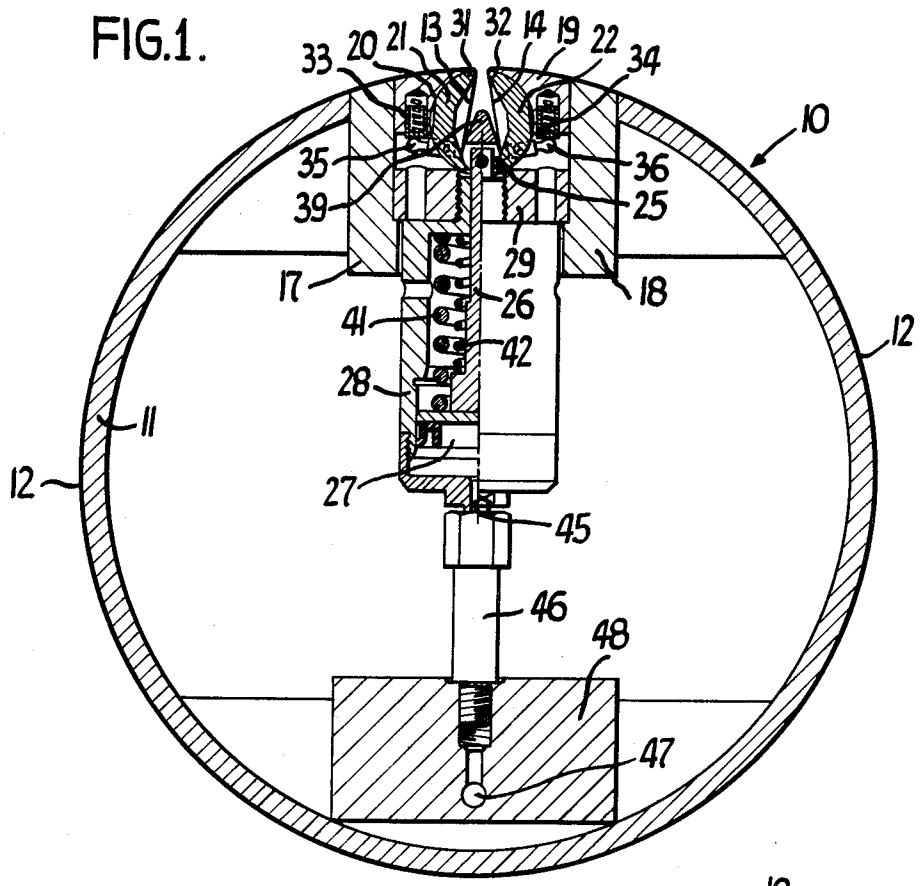
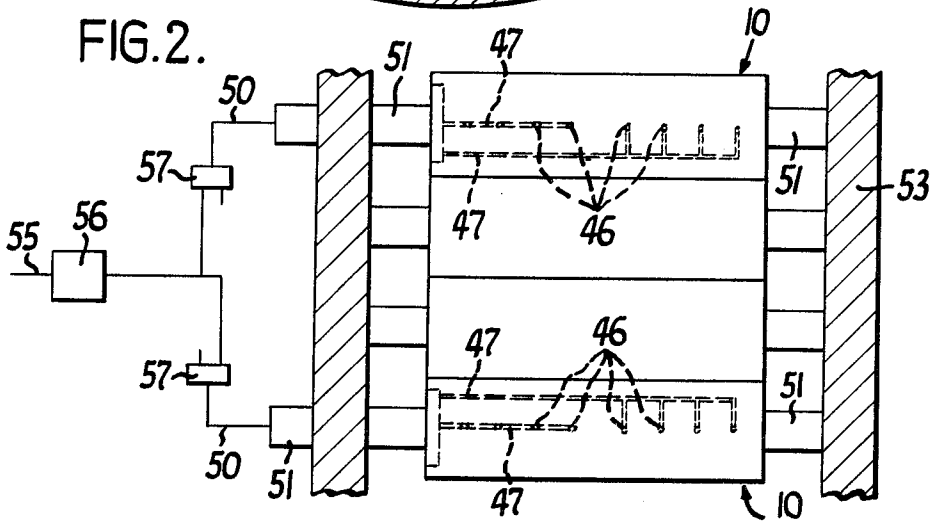


FIG.2.



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PRINTING PRESS PLATE CLAMPING MECHANISM

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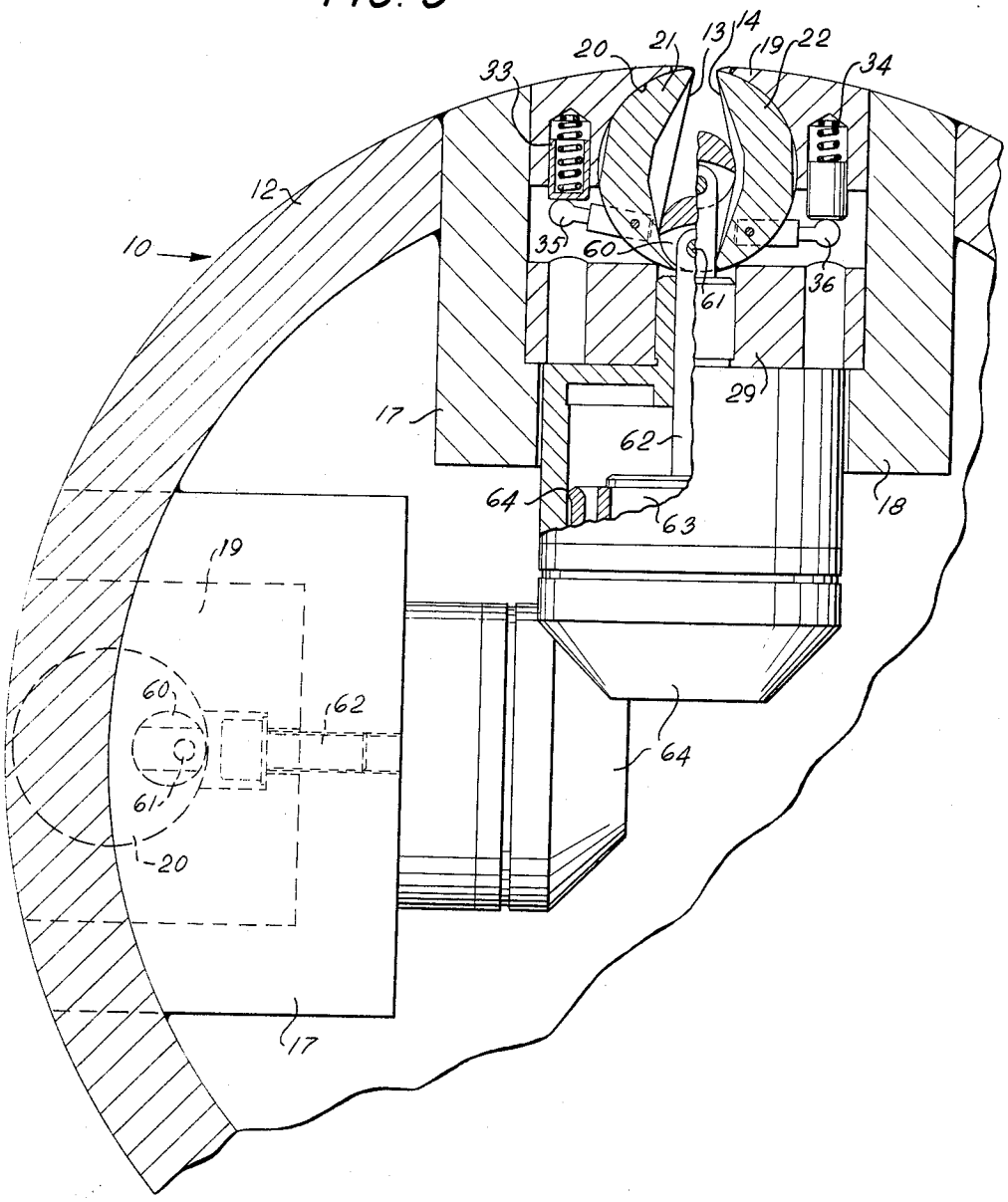
FIG. 3



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PRINTING PRESS PLATE CLAMPING MECHANISM

Filed Sept. 30, 1963 3 Sheets-Sheet 3

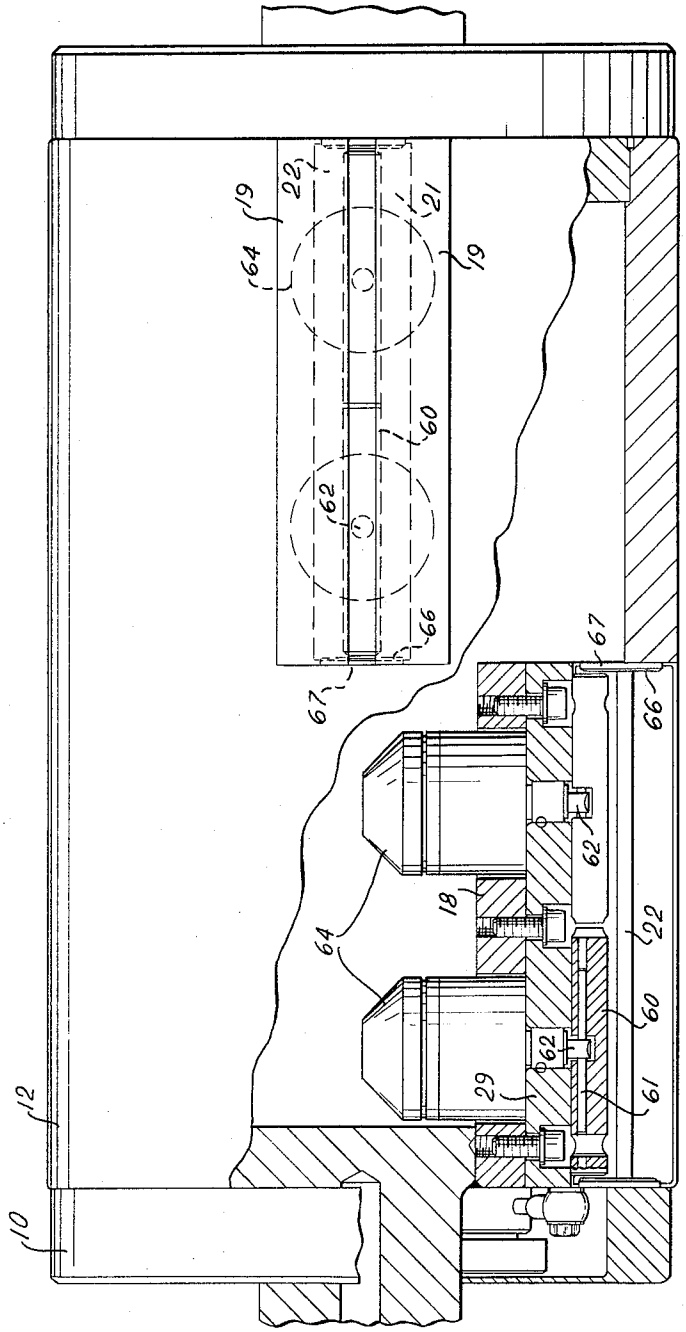

FIG. 4

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3,230,883 PRINTING PRESS PLATE CLAMPING MECHANISM

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Claims priority, application Germany, Mar. 26, 1960, M 44,799; June 14, 1961, M 49,345
18 Claims. (Cl. 101—415.1)

This invention relates to apparatus for clamping printing plates around the plate cylinders of printing presses and, more particularly, to apparatus for clamping opposite axial edges of a flexible printing plate in an axial slot in the plate cylinder to stretch or tension and hold the flexible plate around the cylinder. This application is a continuation-in-part of copending applications Ser. No. 92,538, filed March 1, 1961, and Ser. No. 196,795, filed May 22, 1962, and now both abandoned.

As will be understood, modern high speed rotary printing presses, particularly lithographic presses, may utilize a thin flexible printing plate extending substantially entirely around the plate cylinder. With such an arrangement, opposite axial edges of the plate may be clamped in an axial slot in the plate cylinder in order to hold the flexible plate in position, but the flexible nature of the printing plate and the large extent thereof clear around the cylinder may necessitate actual stretching or tensioning of the printing plate (more than merely statically clamping the edges thereof) to assure that it fits tightly all around the cylinder and eliminates the possibility of flexing or moving, especially when subjected to the pressure of the printing impression.

If one of the principal reasons for using the flexible printing plate is so that it will cover substantially the entire surface of the plate cylinder with a minimum of wasted surface between the meeting axial edges of the plate, these same requirements minimize the space available within the plate cylinder for mechanism to provide the desired clamping and stretching force on the printing plate. Because of the flexible nature of the plate, stretching or tensioning forces in a circumferential direction may need to be quite large in order to achieve the desired tight and immobile holding of the plate on the cylinder surface. Nevertheless, whatever large forces may be necessary to stretch the plate around the cylinder must be overcome in opening the clamping means to remove or insert a printing plate, and some difficulty may be experienced in providing the necessary clamping force with close fitting mechanism having little room for force-increasing leverages and/or in providing within the same limited space and close acting mechanism means for readily and manually overcoming such forces to open or release the clamping mechanism.

Particularly the latter problem may include additional difficulty when it is realized that the operating or actuating mechanism for releasing the plate clamping means should desirably be readily accessible from, at least, the ends of the cylinders and, preferably, from remote locations particularly on large multicylinder presses. Similarly, particularly with very high speed presses, any additional or extra mass or weight of clamping mechanism included within the plate cylinder is just that much more weight or mass which must be rotated along with the plate cylinder to consume additional power and, perhaps, require additionally large or strong journals, bearings, etc.

According to this invention, arrangements of apparatus are provided for clamping the opposite axial edges of a flexible printing plate around a plate cylinder and for stretching the plate tightly into position on the cylinder surface, and with such apparatus arranged to act in a close-coupled manner adjacent the edges of the printing plate simultaneously to clamp the plate edges and tension the plate circumferentially with desirably large forces notwithstanding the close-coupled arrangement of clamping and stretching leverages in a minimum of space. As further features of this invention may be noted the preferred utilization of arcuate clamping rails in a cylindrical bore along the cylinder for both stretching and clamping the plates, clamp members specifically shaped or configured to aid in the original insertion of the opposite plate edges into the clamping apparatus, the provision of adequate clamping force with mechanism disposed radially inwardly of the cylinder but directly linked to the close-coupled clamping members, and provisions for overcoming the clamping force to release the clamping mechanism utilizing pneumatic pressure in a remote control arrangement for convenient remote operation of the clamping means in each plate cylinder.

A still further feature of this invention includes utilizing a plurality of pairs of clamping rails along each printing plate for more even control and tensioning effects, and also positioning the clamping mechanism for two adjacent printing plates displaced about the cylinder by about 90° to minimize possible vibration effects which might be caused by asymmetrical distribution of the clamping mechanism on the cylinder.

With the foregoing and additional objects in view, this invention will now be described in more detail, and other objects and advantages thereof will be apparent from the following description, the accompanying drawings, and the appended claims.

In the drawings:

FIG. 1 is a cross section through a printing press plate cylinder embodying and for practicing this invention;

FIG. 2 is a somewhat diagrammatic showing of two plate cylinders of a printing press and indicating a diagram of pneumatic remote control in accordance herewith;

FIG. 3 is a cross section through a printing press plate cylinder having a somewhat modified embodiment of this invention; and

FIG. 4 is a plan view of the arrangement of FIG. 3 with parts broken away.

Referring to the drawings, in which like reference characters refer to like parts throughout the several views thereof, a plate cylinder for a rotary printing press is indicated generally in FIG. 1 at **10** as being essentially hollow and having around the circumferential surface thereof a thin shell **11**. A thin flexible printing plate, indicated at **12**, extends substantially all around cylinder **10** and includes inwardly bent axial edge portions **13** and **14** for clamping engagement with mechanism described below.

An axial slot or groove along cylinder **10** is defined by two axially extending members **17** and **18**, affixed integrally to shell **11**, and extending along cylinder **10** for at least the axial width of plate **12**. In the axial slot defined between members **17** and **18** is positioned an axial insert or bar **19**, the outer surface of which is generally curved to conform to the outer circumference of cylinder **10**. Axial insert **19** also includes a slotted cylindrical boring **20** therethrough and disposed adjacent the outer circumferential surface thereof. Extending along insert **19** within boring **20** thereof are clamping rails **21** and **22**, having a generally arcuate cross section as indicated in FIG. 1, which rails are arranged to rotate or move angularly within boring **20** toward and away from each other.

A plurality of rounded roller or pressure members **25** are arranged between clamping rails **21** and **22** and along the length thereof, spaced apart axially along the clamping rails as may be desired to provide the necessary clamping force as described below, four of such devices

being indicated in the diagram of FIG. 2 for each set of clamping rails. To each roller member 25 is connected a piston rod 26 affixed to a piston 27 operating radially within a pneumatic cylinder 28, mounted between axial members 17 and 18 and abutting against the radially inner portion 29 of axial insert 19. With such an arrangement, as will be understood, radially inward movement of piston rod 26 and roller member 25 tends to cause arcuate clamping rails 21 and 22 each to rotate or move angularly within boring 20 so that the lower edges thereof (FIG. 1) are separated and the upper or outer edges 31 and 32 of clamping rails 21 and 22 are urged or moved toward each other. Conversely, relaxation or radially outward movement of piston rod 26 and roller member 25 permits outer edges 31 and 32 of clamping rails 21 and 22 to separate, which action is resiliently induced by spring members 33 and 34 acting on studs of levers 35 and 36 connected to clamping rails 21 and 22, respectively, and operating in hollows provided therefor in axial insert 19.

As will be apparent from the foregoing, when roller member 25 is moved to a radially outward position, spring means 33 and 34 urge clamping rails 21 and 22 to rotate within boring 20 so that the outer edges 31 and 32 thereof are separated. Thereupon, a flexible printing plate 12 is applied to the surface of shell 11 of plate cylinder 10, and the inwardly bent edges 13 and 14 of plate 12 are inserted into the axial slot in boring 20 and between edges 31 and 32 of clamping rails 21 and 22. Preferably, the radially outer portion of roller member 25 includes a generally pointed or wedge shaped portion 39 to separate edge portions 13 and 14 of plate 12 and facilitate the insertion thereof between the clamping rails 21 and 22 as shown.

Enough of the opposite axial edges of plate 12 is inwardly bent, forming portions 13 and 14, so that the inward edges of such portions may extend down and around either side of roller member 25 (as indicated in FIG. 1). Thereupon, moving roller member 25 radially inwardly accomplishes the multiple purposes of clamping the extreme edges of plate portions 13 and 14 beneath roller member 25 and against the lower edges of clamping rails 21 and 22, while also forcing these lower edges of the clamping rails apart, and, accordingly, forcing together outer edges 31 and 32 of the clamping rails to stretch or tension plate 12 circumferentially tightly around the outer surface of cylinder shell 11 of plate cylinder 10. Thus the extreme opposite edges of printing plate 12 are firmly clamped between roller member 25 and the radially inner edges of clamping rails 21 and 22, while the radially outer edges 31 and 32 thereof tension printing plate 12 circumferentially in both directions and immediately adjacent the outer circumference of cylinder 10.

The clamping force for urging roller member 25 and piston rod 26 radially inwardly for clamping and tensioning plate 12 around cylinder 10 is provided, in the illustrated embodiment, by compression spring means, indicated as springs 41 and 42 operating between the radially outer end of cylinder 28 and piston 27 therein to urge piston 27 and piston rod 26 and roller member 25 radially inwardly with the desired large clamping force to maintain plate 12 firmly clamped and tensioned around cylinder 10. As indicated in the drawings, such compression spring means for maintaining the desired clamping force are all mounted spaced from and radially inwardly of the actual clamping members 21, 22, 25, etc., so that an adequately large force is readily supplied, as by springs 41 and 42, notwithstanding the close-coupled arrangement of the actual clamping members and the small space in which they are positioned. Such arrangement minimizes the circumferential extent of useless printing surface along the cylinder adjacent the gap or slot between opposite edges of plate 12, yet supplies adequately large clamping forces notwithstanding the difficulty of supplying such force from levers or other means closely associated with the actual clamping members.

As indicated, although the arcuate clamping rails 21 and 22 extend axially along plate cylinder 10 for, preferably, at least the axial dimension of a printing plate 12 to be clamped therearound, a plurality of roller members 25 (each with its associated piston rod 26, piston 27, cylinder 28, and springs 41 and 42) are provided spaced along clamping rails 21 and 22 to produce the desired clamping pressure, with both the number and spacing of such plurality of radially acting mechanisms being selected, in completely known and well understood manner, depending upon the size of the cylinder 10 and plate 12 and the uniformity and amount of clamping pressure necessitated or desired therewith. Nevertheless, the release or opening of the whole plurality of roller members 25, etc., for each printing plate is simultaneously desired for the removal or insertion of printing plates 12. The aggregate force of the plurality of springs 41, 42, providing the desired radially inward clamping pressure, however, may well exceed a force which can conveniently manually be overcome to move the rollers 25 outwardly into released or open position, particularly when it is realized that such radially outward releasing movement is preferably provided by means operable or accessible from the ends of cylinder 10 or, at least, outside the circumferential printing surface thereof.

For this purpose there is provided in accordance herewith the several pneumatic cylinders 28 and means for introducing pneumatic pressure therein against the respective pistons 27 with sufficient force to urge pistons 27 (and piston rods 26 and roller members 25) radially outwardly against the pressure of springs 41 and 42 to release both the clamping and tensioning forces provided on the printing plate by roller members 25 and the outer edges 31 and 32 of clamping rails 21 and 22. As indicated in the drawing, such means include an air passage 45 in the inner end of cylinder 28, to which is connected, in known manner, an air conduit 46 communicating with an axial compressed air manifold 47, illustrated as being incorporated in axially extending block 48 mounted within shell 11 of plate cylinder 10. As somewhat diagrammatically illustrated in FIG. 2, compressed air is supplied into manifold 47, in known manner, through a conduit 50 leading axially through one end of the plate cylinder shaft 51 by which plate cylinders 10 are mounted for rotation between side members 52 and 53 of the printing press.

Thus, compressed air is supplied from a source thereof through supply line 55 and control valve 56 to a three-way valve 57, of conventional and well known design. By operation of three-way valve 57, compressed air is selectively fed through line 50 into manifold 47 and thence through the respective air conduits 46 into the respective cylinders 28 for urging the pistons 27 therein radially outwardly to release the clamping arrangement as above described. After a printing plate 12 has been arranged on cylinder 10 and with the edge portions 13 and 14 in position for clamping, the pneumatic pressure is released or vented, by moving three-way valve 57 to another position, and permits springs 41 and 42 to urge pistons 27 and the various roller members 25 radially inwardly into clamping and tensioning position.

As an additional safety factor, main air control valve 56 is preferably connected or integrated with the main motor control of the printing press so that valve 56 prohibits supply of compressed air whenever the printing press is running, thus removing the possibility that even inadvertent or accidental operation of three-way valves 57 might admit pneumatic pressure to release any of the clamping mechanism except when the printing press is stopped. Further, as indicated in the diagram of FIG. 2, a plurality of plate cylinders 10 on the same press may readily be controlled by a similar plurality of air lines 50 and three-way valves 57, etc., from the same main air supply 55, yet with the clamping mechanism on each in-

dividual plate cylinder separately operable whenever the press is stopped.

As will also be apparent from the foregoing, the operating means for three-way valves **57** may readily and conveniently be arranged at a remote control station, if desired, and need not be closely associated with the individual plate cylinders themselves. Also as indicated in the diagram of FIG. 2, it is preferred that the individual clamping rails and respective plurality of air lines **46** and cylinders **28**, etc., for clamping the edges of one printing plate **12** on a plate cylinder **10** be circumferentially offset by about 90° from the similar clamping mechanism for the edges of an adjacent printing plate **12** on cylinder **10**, as will be understood in accordance with conventional engineering factors in designing plate cylinders for accommodating more than one printing plate therealong, either for purely printing reasons or to equalize within the plate cylinders eccentrically disposed masses of mechanism therein. Similarly, each set of clamping mechanism in accordance herewith for each separate printing plate on the same plate cylinder is readily provided with individual pneumatic pressure control, or all the clamping mechanism on one plate cylinder **10** can be simultaneously operated, if desired, for simultaneous release of the clamping mechanism to remove or insert one or more printing plates **12**.

Referring now to FIGS. 3 and 4, a somewhat different embodiment is illustrated. Thus, the cam or roller **60** is illustrated as having somewhat different shape than roller **25** in FIG. 1, and is operated by somewhat different mechanism than the spring-loaded cylinder **28** described above.

Thus, roller or cam **60** is eccentrically fastened, as by a pin **61**, to the end of a rod **62** connected to a piston **63** in cylinder **64**, wherein piston **63** is radially actuated in either opening or closing position by pneumatic or hydraulic fluid pressure in known manner as by conduits and connections (not shown) and, preferably, accessible entirely from outside the printing press or, at least, the ends of the plate cylinders. With both cylinder **64** of the FIG. 3 embodiment and cylinder **28** of the FIG. 1 embodiment, it may be desired to position such cylinders on the opposite side of the axis of the plate cylinder from the clamping mechanism so that centrifugal force acting on the mass of piston **27** or **63** during rotation of the plate cylinder will tend to urge the plate clamping mechanism toward closed or tensioning position.

For further facilitating the tensioning of the printing plate **12** around cylinder **10**, a plurality of pairs of clamping members **21** and **22**, each with the other appertaining mechanism, are preferably disposed in each axial groove to engage the edges of a single clamping plate—such as illustrated in FIG. 4, although this arrangement is to be understood as also applicable to the embodiment of FIGS. 1 and 2. In this manner, one is better able to smooth out or prevent irregularities which may occur in printing plate **12** when the edges **13** and **14** thereof are bent for clamping by the clamping mechanism. Preferably also, the ends of the clamping rails **21** and **22** also carry slots **66** which are keyed onto fixed pegs or pins **67** as an aid to maintaining the rails positioned in the respective grooves therefor. As previously noted with regard to the arrangement of FIGS. 1 and 2, the clamping mechanisms for engaging the edges of adjacent printing plates along cylinder **10** are preferably disposed therein separated by the 90° from each other (as indicated in FIGS. 3 and 4) in order to avoid shocks and vibrations which might be caused by the presence of the longitudinal groove in the surface of the cylinder, as well as to distribute asymmetrical masses more evenly over the circumference of the cylinder.

As will be apparent from the foregoing, arrangements are provided in accordance herewith for the clamping and tensioning of the opposite axial edges of flexible printing plates around the surface of a printing press plate cylinder, with the edges being engaged and circumferentially stretched by arcuate or crescent shaped clamping rails pivoting in a slot along the surface of the plate cylinder and urged into clamping position by a plurality of axial rollers or cams which also engage the printing plate edges radially inwardly of the cylinder surface while moving the clamping rails to tension the plate adjacent the cylinder surface. The above noted advantages are thus accomplished in accordance herewith, whether the mechanism is held into tensioning and clamping position by the spring loading of the arrangement as in FIG. 1 or by fluid pressure as in FIGS. 3 and 4.

While the structures and arrangements herein described constitute preferred embodiments of this invention, it is to be understood that the invention is not limited to these precise structures and arrangements, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a pair of clamping rails in said cylinder and extending axially therealong adjacent the periphery thereof, said clamping rails defining an axial slot for insertion of said bent opposite edges of said printing plate therebetween and being mounted in said cylinder for angular movement about an axis between said rails from a clamping position in which the radially outer edges of said rails are urged toward each other and the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails approach each other and the radially outer edges thereof are spread apart, a clamping pressure member disposed between said clamping rails and adjacent radially inner edges thereof for clamping opposite axial edge portions of said printing plate against the inner edges of said clamping rails upon radially inward movement of said clamping pressure member, means for urging said clamping pressure member radially inwardly into clamping position against said inner edges of said clamping rails and for urging radially outer edges of said clamping rails toward each other for tensioning said printing plate circumferentially around said plate cylinder, and means for oppositely moving said clamping pressure member out of said clamping position for release of said printing plate.

2. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a pair of clamping rails in said cylinder and extending axially therealong adjacent the periphery thereof, said clamping rails defining an axial slot for insertion of said bent opposite edges of said printing plate therebetween and being mounted in said cylinder for angular movement about an axis between said rails from a clamping position in which the radially outer edges of said rails are urged toward each other and the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails approach each other and the radially outer edges thereof are spread apart, a clamping pressure member disposed between said clamping rails and adjacent radially inner edges thereof for clamping opposite axial edge portions of said printing plate against said inner edges of said clamping rails upon radially inward movement of said clamping pressure member, means for urging said clamping pressure member radially inwardly into clamping position against said inner edges of said clamping rails and for urging radially outer edges of said

clamping rails toward each other for tensioning said printing plate circumferentially around said plate cylinder, and means for moving said clamping pressure member out of clamping position including a radially inwardly extending rod connected to said member and a pneumatic pressure cylinder-and-piston arrangement connected to said rod and within said cylinder and inwardly spaced from said clamping rails for moving said clamping pressure member radially outwardly and out of clamping position.

3. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a pair of clamping rails in said cylinder and extending axially therealong adjacent the periphery thereof, said clamping rails defining an axial slot for insertion of said bent opposite edges of said printing plate therebetween and being mounted in said cylinder for angular movement about an axis between said rails from a clamping position in which the radially outer edges of said rails are urged toward each other and the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails approach each other and the radially outer edges thereof are spread apart, a clamping pressure member disposed between said clamping rails and adjacent radially inner edges thereof for clamping opposite axial edge portions of said printing plate against said inner edges of said clamping rails upon radially inward movement of said clamping pressure member, means for urging said clamping pressure member radially inwardly into clamping position against said inner edges of said clamping rails and for urging radially outer edges of said clamping rails toward each other for tensioning said printing plate circumferentially around said cylinder, said last mentioned means including a radially inwardly extending rod connected to said clamping pressure member and spring means for urging said rod radially inwardly with said spring means being spaced inwardly of said cylinder from said clamping rails and said clamping pressure member, and means for oppositely moving said clamping pressure member out of said clamping position against the action of said spring means for release of said printing plate.

4. Apparatus as recited in claim 3 in which said means for moving said clamping pressure member out of clamping position includes a pneumatic pressure cylinder-and-piston arrangement within said printing press plate cylinder and inwardly spaced from said clamping rails for temporarily overcoming said spring means for urging said clamping pressure member into said clamping position.

5. Apparatus as recited in claim 4 in which said means for urging said clamping pressure member into said clamping position includes spring means within said pneumatic pressure cylinder and acting between one end thereof and said piston therein for urging said piston and said clamping pressure member radially inwardly in the absence of pneumatic pressure in said pressure cylinder.

6. Apparatus as recited in claim 2 which also includes means for supplying pneumatic pressure to said pneumatic cylinder-and-piston through the axis of said plate cylinder as mounted in said printing press, and a pneumatic pressure valve connected to said printing press for automatically preventing supply of said pneumatic pressure except when said printing press is stopped.

7. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a pair of clamping rails in said cylinder and extending axially therealong adjacent the periphery thereof, said clamping rails defining an axial slot for insertion of said bent opposite edges of said printing plate therebetween and being mounted in said cylinder for angular movement about an axis between said rails

from a clamping position in which the radially outer edges of said rails are urged toward each other and the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails approach each other and the radially outer edges thereof are spread apart, a clamping pressure member disposed between said clamping rails and adjacent radially inner edges thereof for clamping opposite axial edge portions of said printing plate against the inner edges of said clamping rails upon radially inward movement of said clamping pressure member, mean for urging said clamping pressure member radially inwardly into clamping position against said inner edges of said clamping rails and for urging radially outer edges of said clamping rails toward each other for tensioning said printing plate circumferentially around said plate cylinder, and means for oppositely moving said clamping pressure member out of said clamping position for release of said printing plate, said means for urging said clamping pressure member into clamping position and said means for oppositely moving said member out of said clamping position including a radially inwardly extending rod connected to said member and a pneumatic pressure cylinder-and-piston arrangement connected to said rod and disposed within said printing press plate cylinder for selectively moving said rod and said clamping pressure member radially inwardly and outwardly of said press cylinder.

8. Apparatus as recited in claim 1 in which said clamping rails are formed of generally arcuate cross section and are mounted within a slotted cylindrical bore extending axially along said plate cylinder, and in which said clamping pressure member is disposed adjacent and for pressure contact with radially inner edges of said clamping rails for separation of said radially inner edges upon inward movement of said clamping pressure member into said clamping position.

9. Apparatus as recited in claim 1 in which said clamping pressure member is formed as a roller for engaging said radially inner edges of said clamping rails and clamping thereagainst said opposite axial edges of said printing plate.

10. Apparatus as recited in claim 1 in which said clamping pressure member is formed with a generally wedge-shaped radially outer portion for separating and guiding said opposite axial edges of said printing plate into said clamping position.

11. Apparatus as recited in claim 1 in which there is provided a plurality of said clamping pressure members along said clamping rails and individual means for urging each of said clamping pressure members into and out of said clamping position.

12. Apparatus as recited in claim 11 in which remote control and pneumatic pressure supply means are provided for simultaneously separating and releasing all of said plurality of clamping pressure members edges.

13. Apparatus as recited in claim 1 which also includes a spring-pressed plunger mounted adjacent each of said clamping rails and lever means connecting said plunger to its respective rail for separating radially outer edges of said rails upon release of said clamping pressure member from said clamping position.

14. Apparatus as recited in claim 8 which also includes slots in the opposite ends of each said clamping rail and pegs fixed in said cylindrical bore and keyed into said slots for holding said clamping rails in place.

15. Apparatus as recited in claim 1 which includes a plurality of sets of said clamping rails in said printing press plate cylinder spaced axially therealong and spaced angularly around said cylinder by about 90° from each other.

16. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a slotted cylindrical bore extending

axially of said cylinder and adjacent the periphery thereof, a pair of clamping rails in said bore, said clamping rails having a substantially arcuate cross-section and being angularly movable within said bore from a clamping position in which the radially outer edges of said rails are urged toward each other while the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails are urged toward each other while the radially outer edges are spread apart, said clamping rails thus defining therebetween a variable axial slot for receiving said bent edge portions of said printing plate in clamping and tensioning engagement, a clamping pressure member disposed in said axial slot and between said clamping rails therein, means for mounting said clamping pressure member for radial movement within said slot for engaging radially inner edges of said clamping rails to force said edges apart and concomitantly to force radially outer edges of said clamping rails toward each other, the surface portions of said clamping pressure member which engage said radial inner edges of said clamping rails forming clamping surfaces for clamping and holding opposite axial edge portions of said printing plate, means for urging said clamping pressure member radially inwardly for clamping said edges of said printing plate and for urging said radially outer edges of said clamping rails toward each other to impose opposite circumferential tensioning forces on said printing plate around said plate cylinder substantially at the bend of said bent axial edge portions thereof, and means for releasing said radially inward urging means effecting radially outward movement of said clamping and pressure member and release of said bent edge portions of said printing plate clamped thereby.

17. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a cylindrical bore extending axially of said cylinder and adjacent the periphery thereof, a pair of clamping rails in said bore and being angularly movable therein from a clamping position in which the radially outer edges of said rails are urged toward each other while the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails are urged toward each other while the radially outer edges are spread apart, said clamping rails thus defining therebetween a variable axial slot for receiving said bent edge portions of said printing plate in clamping and tensioning engagement, a clamping pressure member disposed in said axial slot and between said clamping rails therein for engaging radially inner edges of said clamping rails to force said edges apart and concomitantly to force radially outer edges of said clamping rails toward each other, the surface portions of said clamping pressure member which engage said radial inner edges of said clamping rails forming clamping surfaces for clamping and holding opposite axial edge of said printing plate and the radial outer portion of said clamping pressure member being generally wedge-shaped for aiding in separating and guiding said opposite axial edges of said printing plate into said clamping engagement, spring means spaced inwardly of said clamping rails for urging said clamping pressure member radially inwardly for clamping said edges of said printing plate and for urging said radially outer edges of said clamping rails toward each other to impose opposite circumferential tensioning forces on said printing plate around said plate cylinder substantially at the bend of said bent axial edge portions thereof, and pneumatic pressure means for temporarily overcoming said spring means effecting radially outward movement of said clamping and pressure member and release of said bent edge portions of said printing plate clamped thereby.

18. In apparatus of the character described for clamping and tensioning a flexible printing plate around the surface of a printing press plate cylinder by inwardly bent opposite axial edge portions of said plate, the combination which comprises a pair of clamping rails in said cylinder and being angularly movable therein from a clamping position in which the radially outer edges of said rails are urged toward each other while the radially inner edges are spread apart to a non-clamping position in which the radially inner edges of said rails are urged toward each other while the radially outer edges are spread apart, said clamping rails thus defining therebetween a variable axial slot for receiving said bent edge portions of said printing plate in clamping and tensioning engagement, a clamping pressure member disposed in said axial slot and between said clamping rails therein for engaging radially inner edges of said clamping rails to force said edges apart and concomitantly to force radially outer edges of said clamping rails toward each other, the surface portions of said clamping pressure member which engage said radial inner edges of said clamping rails forming clamping surfaces for clamping and holding opposite axial edge portions of said printing plate, means for urging said clamping pressure member radially inwardly for clamping said edges of said printing plate and for urging said radially outer edges of said clamping rails toward each other to impose opposite circumferential tensioning forces on said printing plate, and means for releasing said radially inward urging means for outward movement of said clamping and pressure member and release of said bent edge portions of said printing plate clamped thereby.

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EUGENE R. CAPOZIO, *Primary Examiner.*