United States Patent [19]

Gregoire

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[54] ROLLER BENDER FOR OFFSET PRINTING PLATES

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[52] **U.S. Cl.** **72/213**

[51] **Int. Cl.** **B21d 9/08**

[58] **Field of Search** 72/210, 212, 213, 72/320, 321, 401, 215

[56] **References Cited**

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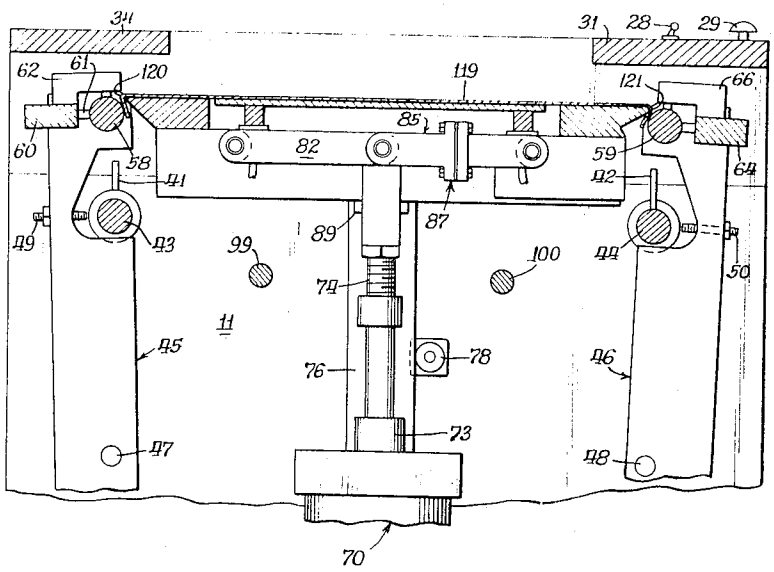
[57] **ABSTRACT**

A bending machine for offset printing plates. The bender includes a table support for the plate to be bent. The table is provided with end edges having contours identical to the desired contours of the end edges of the plate after bending. Spring biased rollers are employed to bend the end edges of the plate around the contoured ends of the table support.

6 Claims, 9 Drawing Figures



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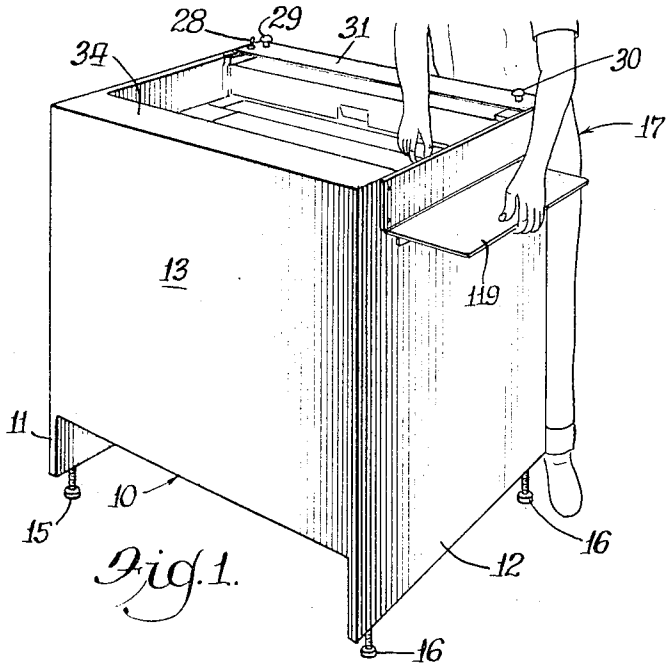


Fig. 1.

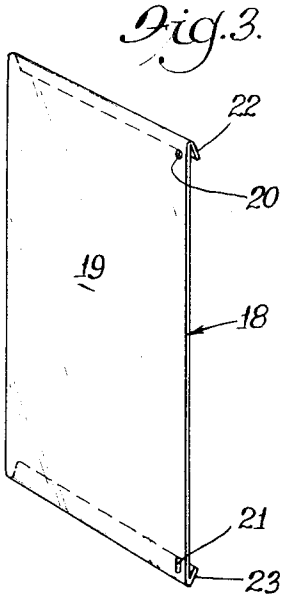
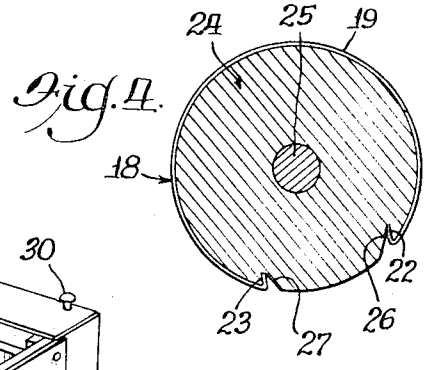


Fig. 3.



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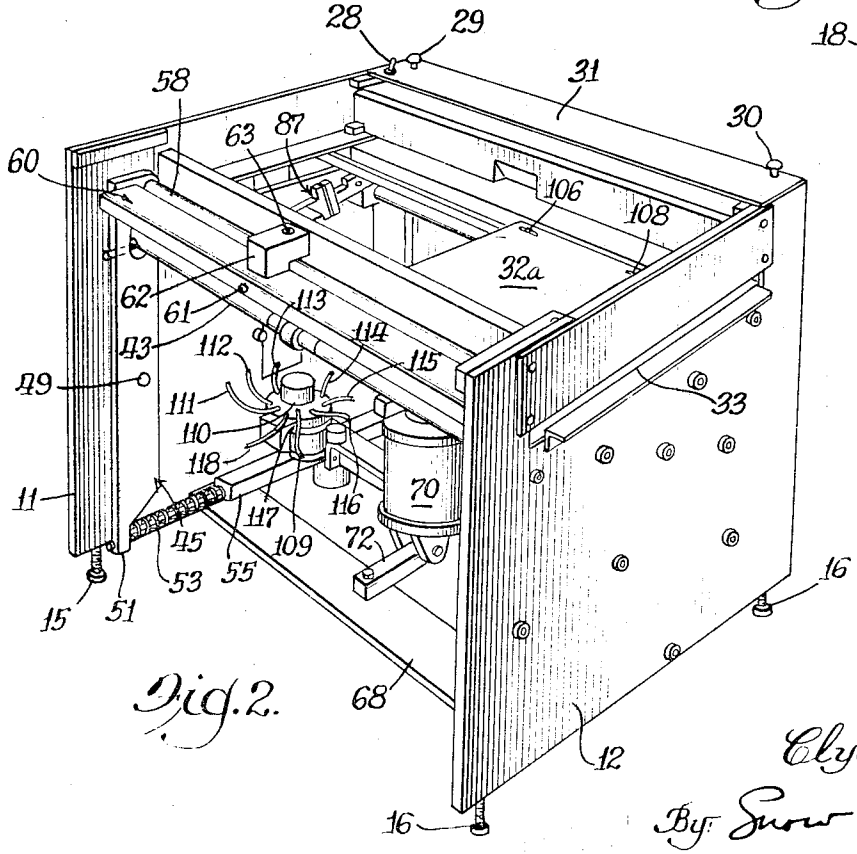

Fig. 2.

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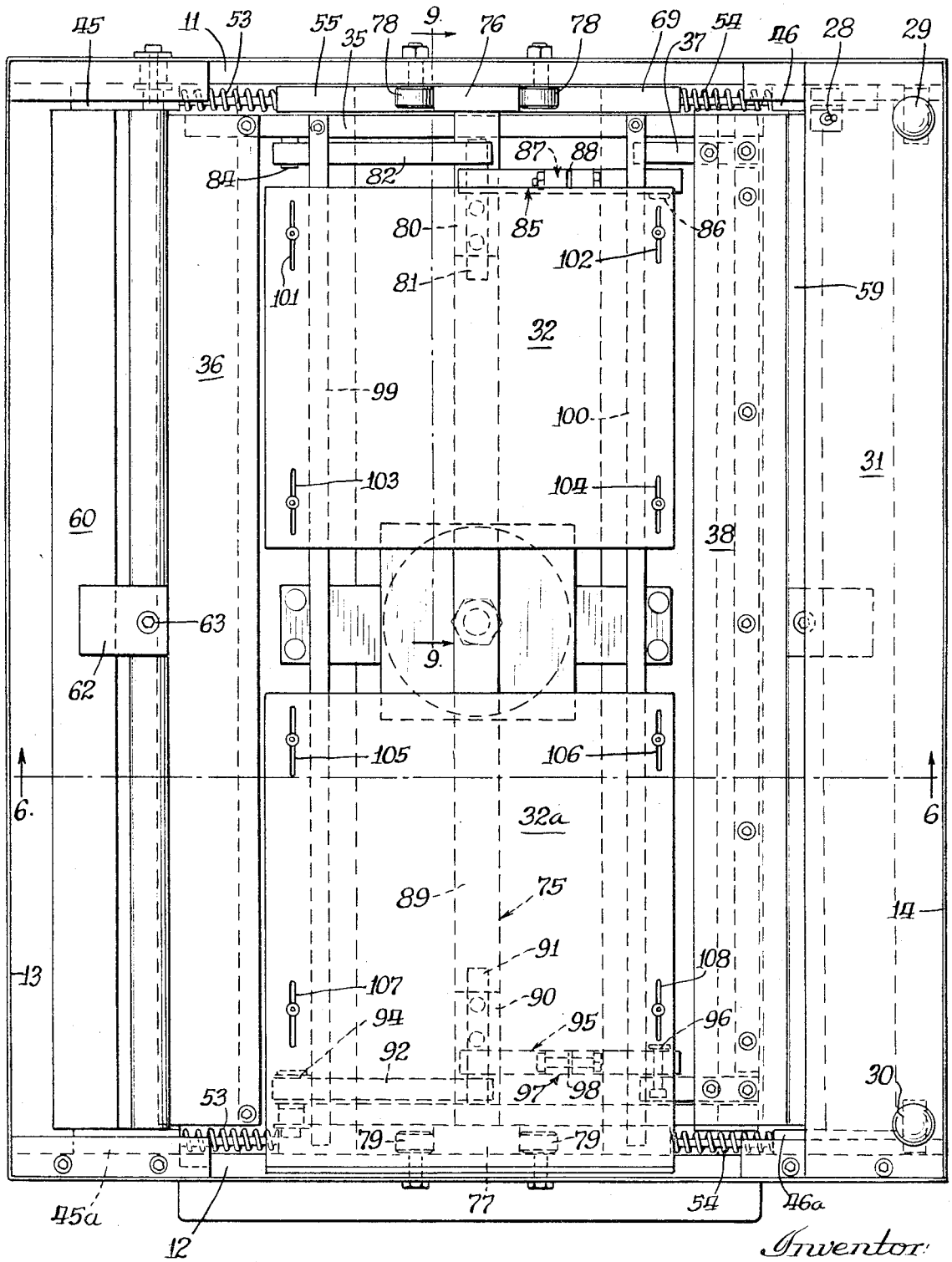

Fig. 5.

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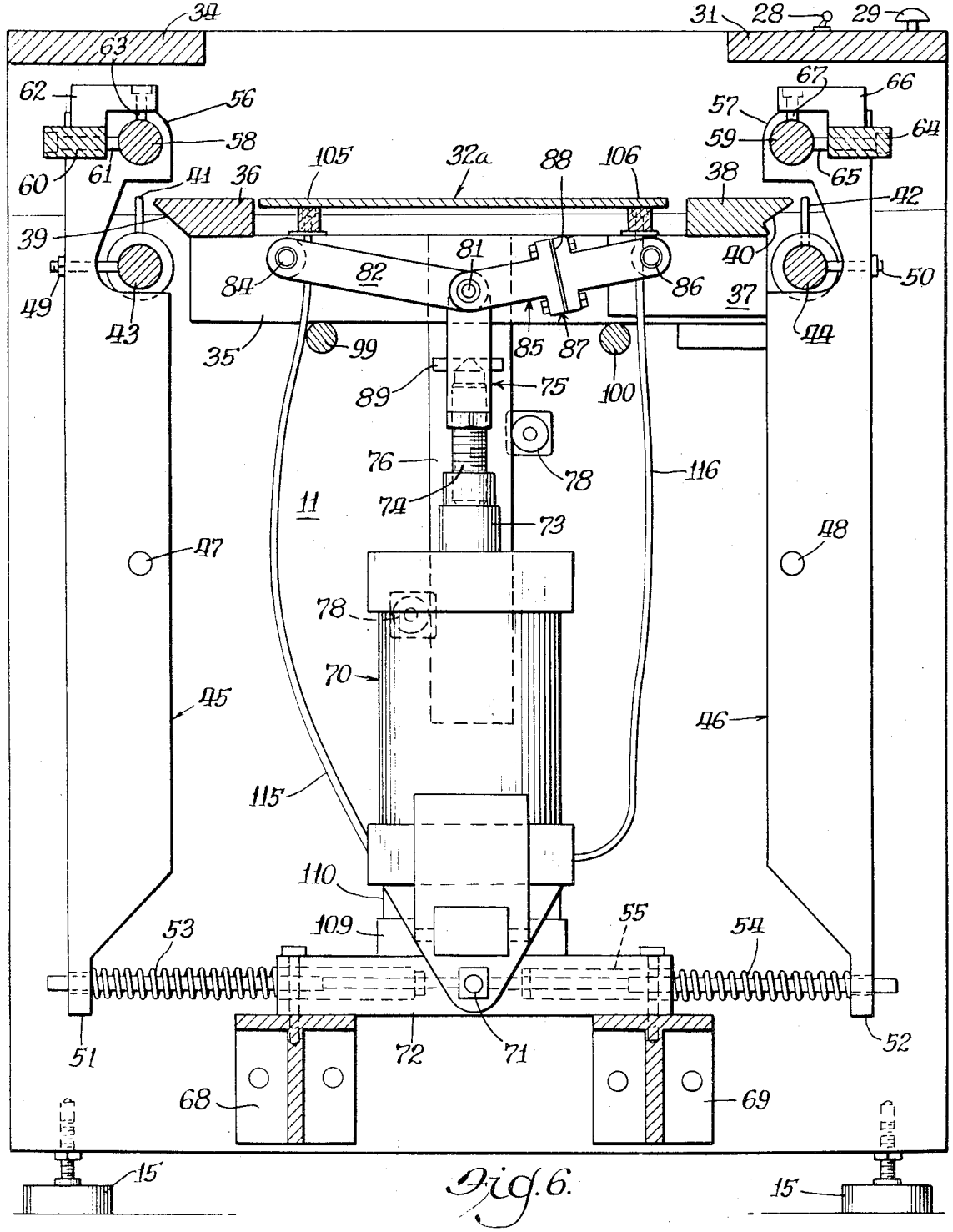

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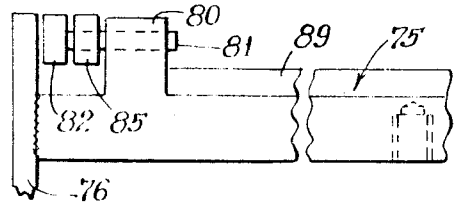

Fig. 9.

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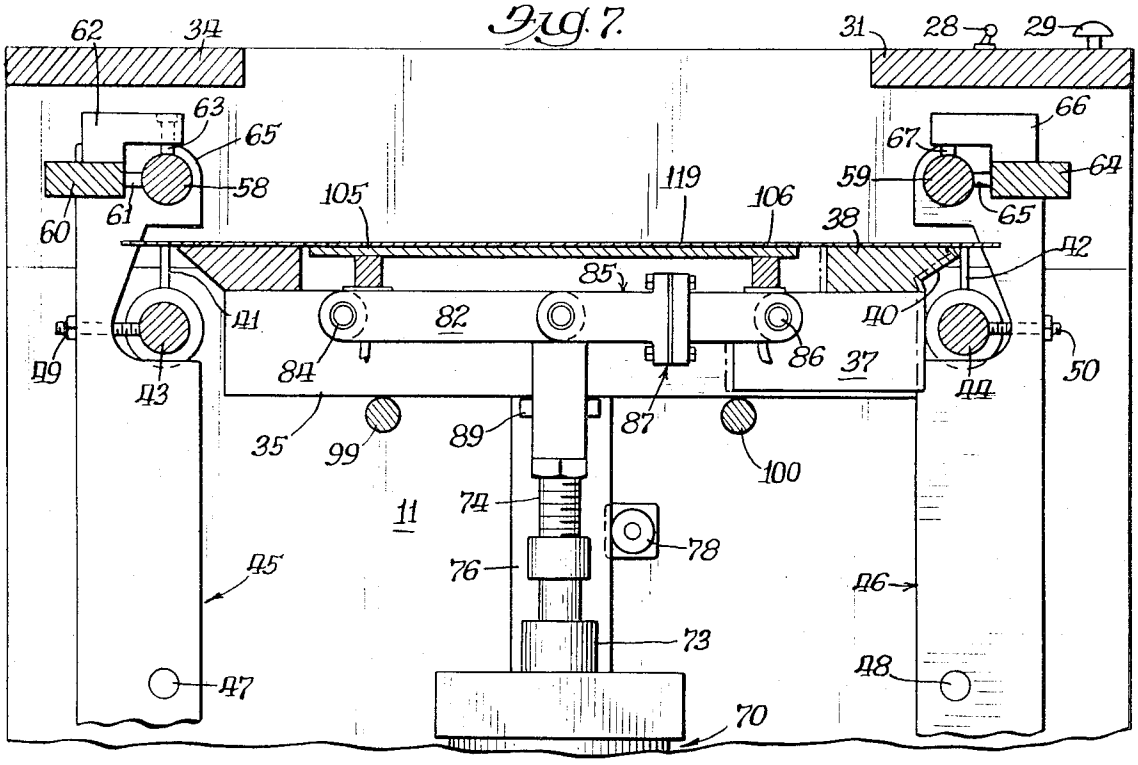
Fig. 7.



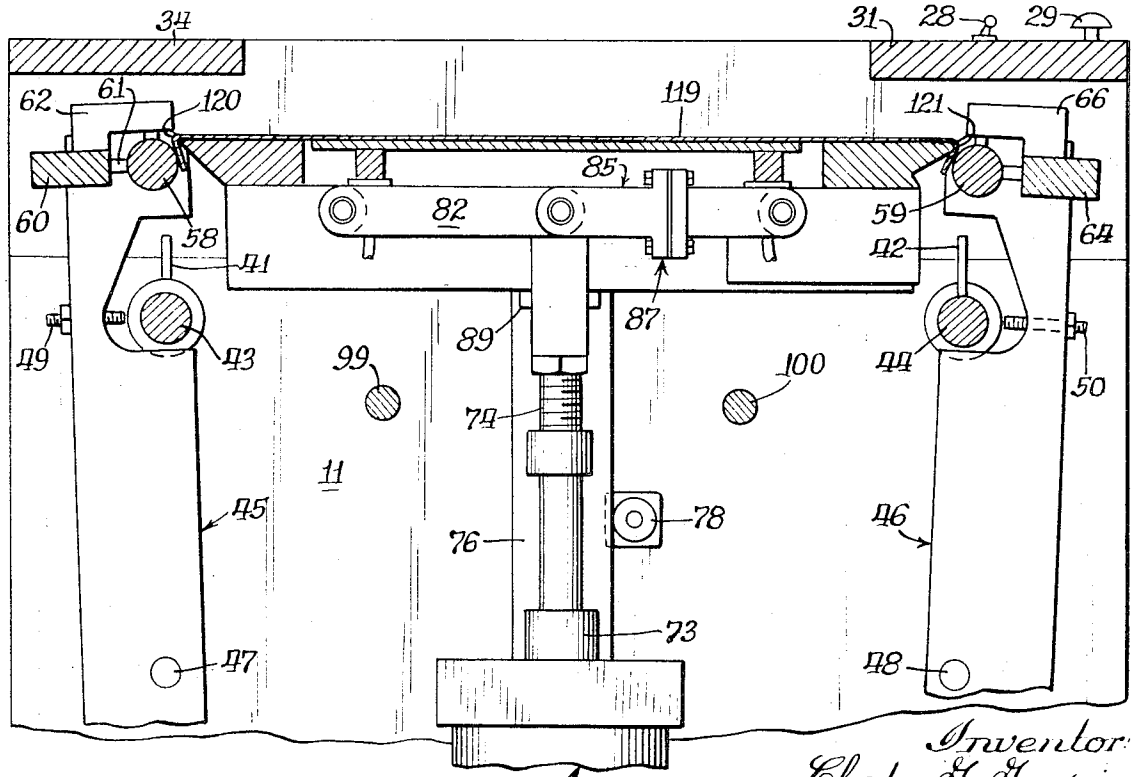


Fig. 8.

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ROLLER BENDER FOR OFFSET PRINTING PLATES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The offset printing industry uses thin plates, usually of aluminum or other metal or metal alloy, onto which an image to be printed is deposited by photographic processes. When the plates are subsequently used in a printing press it is desirable to accurately position the plate so that the printed image is properly centered on the printed page. The necessity for proper positioning of the plate immeasurably increases when multiple colors are used and two or more plates are impressed on the same printed page. It is obvious that without such accurate positioning there would be improper color registration.

The plates are ordinarily wrapped around cylinders in presses while they are used to effect an imprinting. As a rule the plates are held on the cylinder by clamping means engaging the end edges of the plate. This clamping is facilitated by the bending of the end edges at some predetermined position and in some predetermined contour or configuration which complements a receiving contour in the surface of the mounting cylinder. Exact and accurate bending of the plates is thus of the utmost importance in obtaining a good printing job.

2. Description of the Prior Art

There have been many attempts to provide mechanized bending of the ends of offset printing plates but to our knowledge all have been more or less failures. Most bending done today is by manual means which is slow and tedious and not always as accurate as desired. The printers of daily newspapers of any size have the task of bending the ends of plates for each page. Also, with advertising revenues at present rates it would be unthinkable for a publisher to skip one page of this paper with advertising content because of a faulty plate. This means that not only must the printer bend the ends of a plate for each page but also must bend the ends of a back up plate or plates for each page.

SUMMARY OF THE INVENTION

The present invention relates to a new and improved bender for the ends of offset printing plates known generally as semi-cylindrical or wrap-around.

An important object of this invention is to provide novel rolling means for causing the bending of the ends of offset printing plates around the contoured ends of a plate supporting table.

Another important object of this invention is to provide novel means for mounting the bending rolling means to follow the contoured end edges of the plate supporting table.

Another important object of this invention is to provide a novel means for bending the end edges of an offset printing plate by moving a plate supporting table past yieldably mounted bending rollers.

Still another important object of this invention is to provide hinged arm means for carrying the yieldably mounted bending rollers and means for normally spring urging the arms in such a manner that the rollers are moved inwardly against the ends of the plate to be bent.

Another important object of this invention is the provision of a device as set forth in the preceding object in which all accumulations of possible errors in the exact size bending of plates are nullified due to the inward or central biasing of the rollers.

A still further important object of this invention is to provide a novel supporting table for an offset printing plate to be bent and including an extensible and retractable end edge to facilitate adjustable spacing of the end edges and easy removal of the plate after bending.

A still further important object of this invention is to provide a novel bender for the ends of wrap-around offset printing plates which includes a vacuum table to prevent the plate from moving during the bending cycle.

Other and further important objects and advantages will become apparent from the disclosures in the following specification and accompanying drawings.

IN THE DRAWINGS

FIG. **1** is a perspective view of the exterior of the plate bending machine of this invention.

FIG. **2** is a view similar to FIG. **1** with portions of the outer walls removed to disclose the interior.

FIG. **3** is a perspective view of an offset printing plate with the ends thereof bent by the device of this invention.

FIG. **4** is a cross sectional view of a printing machine cylinder adapted to receive an offset printing plate on the surface thereof in a wrapping therearound.

FIG. **5** is a top plan view of the device of FIGS. **1** and **2**.

FIG. **6** is a sectional view taken on the line **6—6** of FIG. **5**.

FIG. **7** is a partial view of the device as in FIG. **6** with the one end edge of the table fully extended.

FIG. **8** is another partial view of the device as in FIGS. **6** and **7** with the plate supporting table moved up to permit the spring biased rollers to engage and bend the ends of the plate to conform to the contour of the end edges of the supporting plates.

FIG. **9** is a detail view of a part of the end of the table lift bar as taken on the line **9—9** of FIG. **5**.

AS SHOWN IN THE DRAWINGS

The reference numeral **10** indicates generally the offset printing plate bending machine of this invention. The bending machine includes a housing or supporting structure having spaced apart end walls **11** and **12**, a front wall **13**, and a back wall **14**. The end wall **11** has spaced apart floor engaging legs **15** and similarly the end wall **12** has spaced apart floor engaging legs **16**. The legs **15** and **16** are vertically adjustable to provide for convenient levelling of the bending machine.

As best shown in FIG. **1** an operator **17** is standing at the bending machine **10**. The top of the machine is about waist high and permits easy insertion of plates to have their ends bent. Also, removal of the plates after bending is made easy as will hereafter be described. The rectangular plates used in offset printing machines are made of thin metal and are wrapped around cylindrical rollers so their shape in printing use is generally semi-cylindrical. FIG. **3** is an illustration of an end bent plate **18**. The plate comprises a rectangular central portion **19**, a position registering circular hole **20**, a position registering elongated hole **21**, a bent end **22**, and a bent end **23**. The plates used in the printing process are prepunched with the registering holes **20** and **21** and after the printing matter is deposited on the rectangular surface **19** by a photographic process the ends are accurately bent for the purpose of holding the printing

plate in a printing cylinder used in printing machines. FIG. 4 illustrates a printing cylinder 24 onto which the bent end plate 18 is mounted. The cylinder includes a central shaft 25 and arcuately spaced apart undercut notches 26 and 27 in the cylindrical surface. The notch 26 is adapted to receive the acutely bent end 22 while the notch 27 receives and grips the acutely bent end 23. The interengagement of the bent ends with the undercut notches in the cylinder act to hold the body of the bent end plate snuggly against the surface of the cylinder during the printing operation.

As best shown in FIG. 2 a toggle switch 28 acts to energize an electric motor operated vacuum pump to be subsequently described. The other controls of the bending machine include spaced apart dual operating starter switches 29 and 30 which insure that the operator's hands are out of the way when the machine does its bending. All the control switches 28, 29, and 30 are mounted on a top frame member 31. The machine of this invention as shown in the disclosed embodiment is sufficiently long between the end walls 11 and 12 to accommodate two plates for simultaneous bending. As shown in FIG. 5 separate, side-by-side tables 32 and 32*a* are provided in the machine to receive two plates for bending. In FIG. 2 table 32 has been removed to show the interior of the machine. A horizontally disposed slot 33 is provided in the end wall 12 to conveniently insert plates to be end bent or removed after bending is completed.

As best shown in FIG. 6 another top frame member 34 is provided adjacent the front wall 13. The top frame member 34 is parallel to and spaced apart from the top frame member 31. These two frame members 31 and 34 flank the ends of the plate receiving tables 32 and 32*a* as shown in FIG. 5.

The construction of the underside of the tables 32 and 32*a* is best shown in FIGS. 6, 7, and 8. A base 35 is adapted to carry the table tops 32. An end edge 36 of the table is fixedly mounted on the base 35. On the other side of the base support 35 is a slidably movable section 37. Another opposite end edge 38 of the table is mounted on the movable section 37. The table end edges 36 and 38 are parallel to each other and both have contoured or configuration endings 39 and 40 respectively over which the plates are to have their ends bent. The end edge 36 is stationary while the end edge 38 is movable in and out to permit easy insertion of the plate and easy removal of the bent plate.

Spaced apart plate registration pins 41 and 42 are provided to hold the plates to be bent during initial application to the tables. The pin 41 is mounted on a stationary rod member 43 forming part of the basic supporting structure of the bending machine. The rod extends between and is carried on the end walls 11 and 12. The pin 42 is mounted on a stationary rod member 44 which is disposed parallel to and spaced apart from the rod 43. The rod 44 is also carried in the end walls 11 and 12 and spans the space therebetween to form a part of the basic supporting structure of the bending machine.

Generally vertically disposed spaced apart arms 45 and 46 are pivotally mounted respectively on the end wall 11 at 47 and 48. An adjustable stop member 49 threadedly engages the arm 45 and is adapted to have its end pass through the arm 45 and abut the stationary rod 43 and thereby limit the inward swinging movement of the arm 45. Similarly an adjustable stop member 50 is threaded into the arm 46 and is adapted to have its end abut the stationary rod 44 and thus limit the inward swinging of the arm 46. The normal disposition of the arms is generally vertical. However, during the bending operation the arms may and do swing outwardly. The arm 45 has a lower portion 51 and similarly the arm 46 has a lower portion 52. Extension springs 53 and 54 are disposed between the lower end portions 51 and 52 thus causing the pivoted arms to be urged outwardly at their lower ends and inwardly at their upper ends. A central stationary support 55 is arranged and constructed to receive the inner ends of the extension springs 53 and 54. The upper ends of the arms 45 and 46 are identified respectively by the numerals 56 and 57.

A plate bending roller 58 has its one end journaled in the upper end 56 of the swingable arm 45. Another arm 45*a*, identical to the arm 45, is mounted for pivoting support on the other end wall 12. The other end of the roller 58 is journally mounted in the arm 45*a*. Another plate bending roller 59 has its one end journaled in the upper end 57 of the swingable arm 46. The other end of the roller 59 is journally carried in an arm 46*a* which is the mate of the arm 46. The arm 46*a* is pivotally mounted on the end wall 12. The rollers 58 and 59 thus lie parallel to one another and by reason of their mounting on the spring biased arms 45, 45*a*, 46 and 46*a* they are urged inwardly against the contoured ends 39 and 40 of the plate holding tables 32 and 32*a*. The rollers 58 and 59 have been shown with smooth cylindrical surfaces. However, if it is desired to have reverse bends in the plate edges the rollers may be notched to engage cooperatively notched outer edges 36 and 38 of the table supporting the plates to be bent.

A bar 60, rectangular in cross section, extends between the arm 45 and the arm 45*a* and acts as a stabilizer for the roller 58 and in the holding of the arms 45 and 45*a* in fixed relationship for movement in unison. An adjustable screw 61 threadedly engages the bar 60 and has its inner end adapted to abut the back of the bending roller 58 as best shown in FIG. 6. An L-shaped block 62 is affixed to the top of the bar 60 at the center thereof. A portion of the block 62 overhangs the roller 58 as shown in both of FIGS. 2 and 6. Another adjustable screw 63 is vertically disposed and threadedly engaged in the block 62 directly above the roller 58. The lower end of the screw 63 abuts the top of the bending roller 58. Both adjusting screws 61 and 63 act to prevent the roller from deflecting away from its normal position during the severe load imposed thereon when bending the ends of offset printing plates. With undesired deflection eliminated, uniform bending along the full end of the plate is insured.

A bar 64, also rectangular in cross section, is similar to the bar 60 and extends between the arms 46 and 46*a* and acts as a back-up for the roller 59. Adjustable screw 65 is threaded into and through the bar 64 and has its inner end abutting and supporting the roller 59. An L-shaped block 66 similar to the L-shaped block 62 is mounted on the center of the bar 64 and is equipped with a vertically disposed threaded adjusting screw 67 for abutting the top of the roller 59. As in the case of the adjusting screws 61 and 63 the roller abutting screws 65 and 67 prevent the roller 59 from deflecting during the plate bending operation.

The lower end of the housing or supporting structure is provided with reinforcing T-frame members 68 and