United States Patent

Dreyer

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[54] **SHEET FEED PRESS FOR PRINTING SMALL SIZE SHEETS ON BOTH SIDES SIMULTANEOUSLY**

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[52] **U.S. Cl.**.....**101/217,** 101/229

[51] **Int. Cl.**.....**B41f 5/02**

[58] **Field of Search**.....101/216–218, 229–231, 101/177, 175, 174, 232–242

[56] **References Cited**

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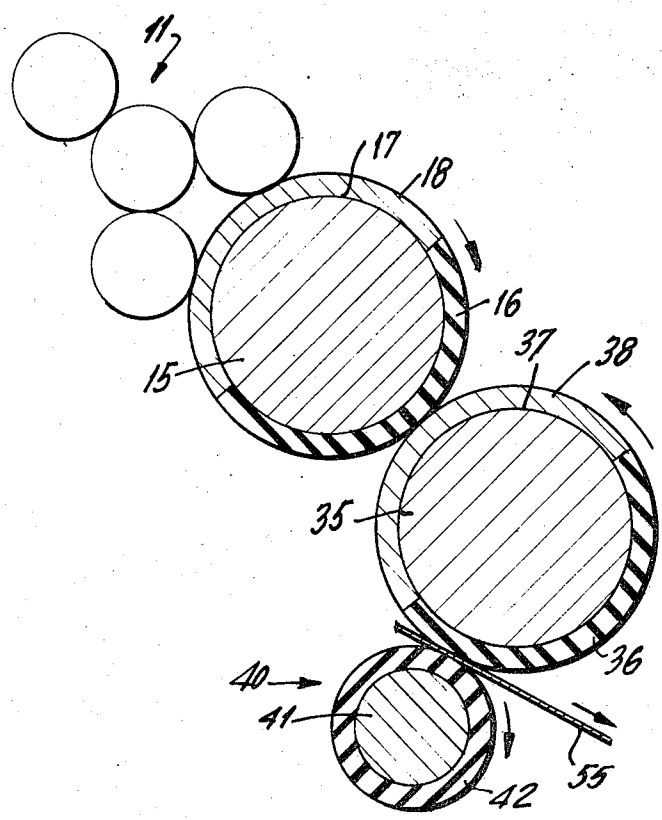
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[57] **ABSTRACT**

This press has three rubber rollers. Two contacting rubber rollers of same diameter have 180° cut-outs receiving printing plates of any angular extent up to 180° with the rubber of each one contacting the plate of the other as these two rollers roll in opposite directions by means of gearing. When the printing plate is a full 180°, the rubber layer on one roller always contacts the printing plate of the other. The third roller is rubber all around and has a circumference equal to half of the circumference of each of the first two rollers. A single inking system applies ink to the first of the two rollers. Thus, the first of the two rollers accomplishes a double function as plate and inkroller, the second of the first two rollers has the function of a plate and blanket roller and the third smaller roller acts as a blanket and impression roller, so that a sheet fed between the second of the two rollers and the smaller roller, is printed on both sides simultaneously.

12 Claims, 6 Drawing Figures



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SHEET 1 OF 2

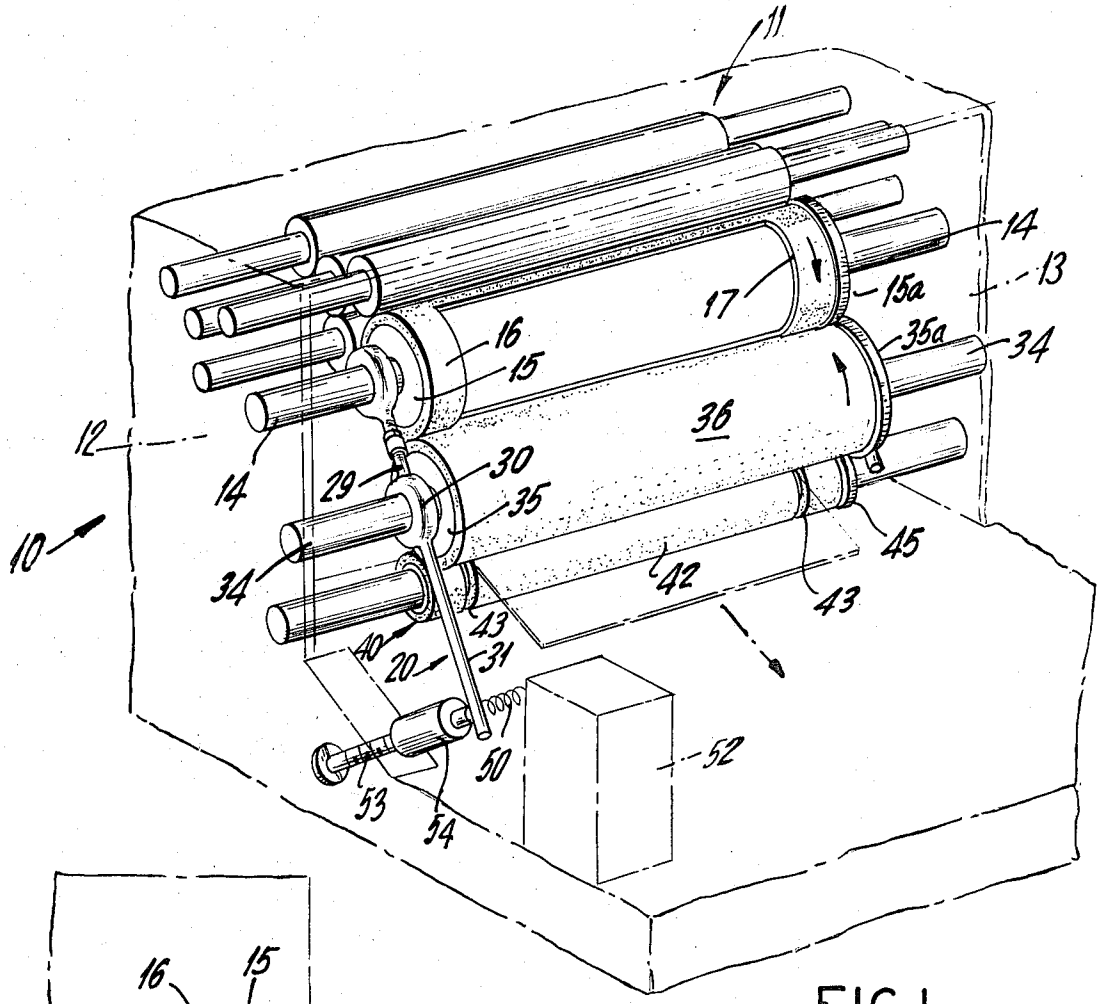


FIG. 1

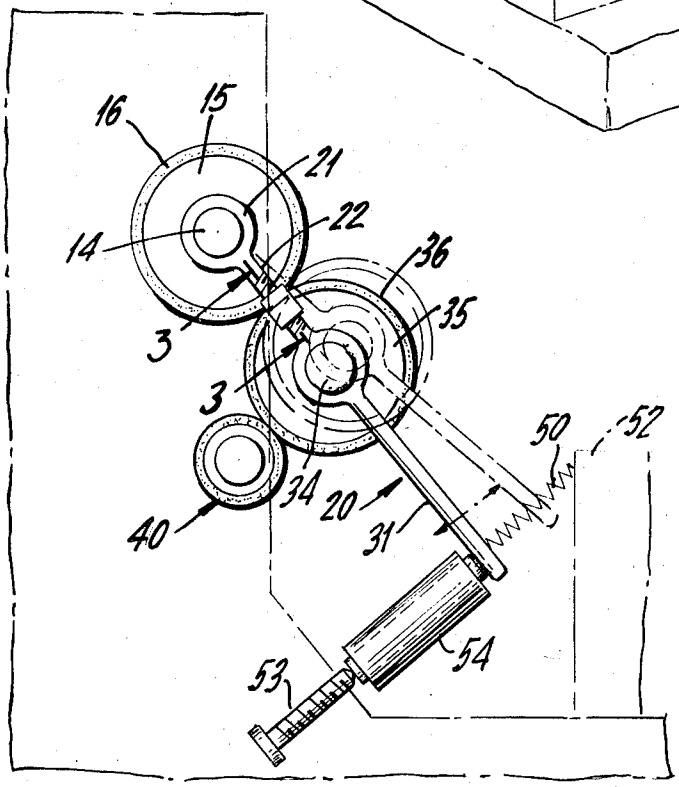


FIG. 2

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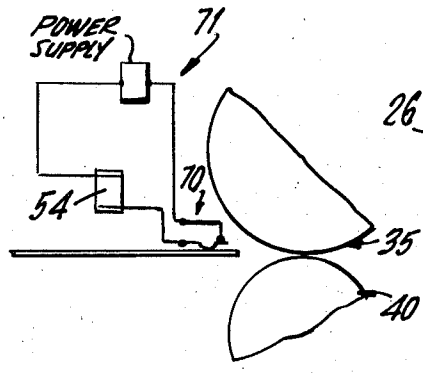


FIG. 6

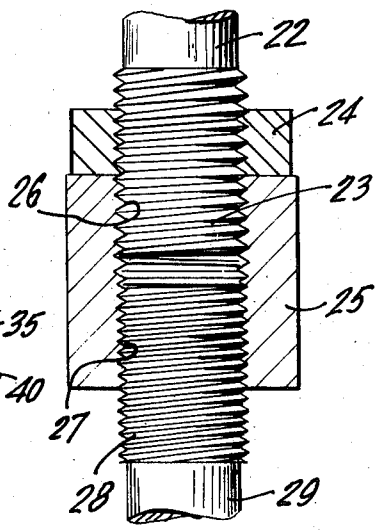


FIG. 3

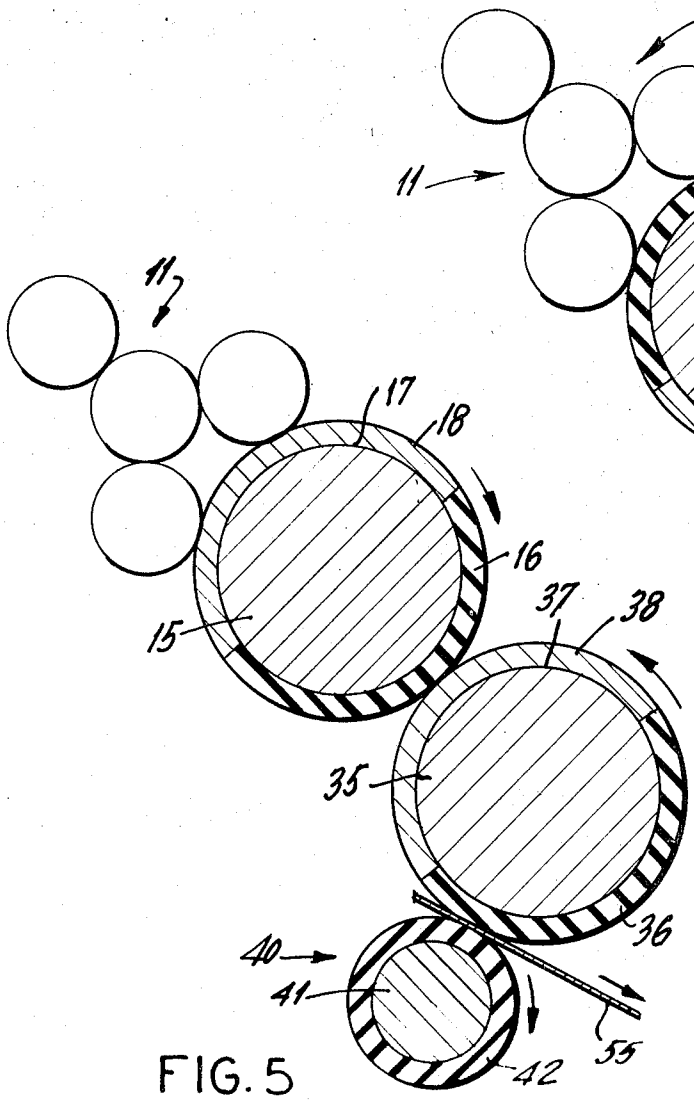


FIG. 5

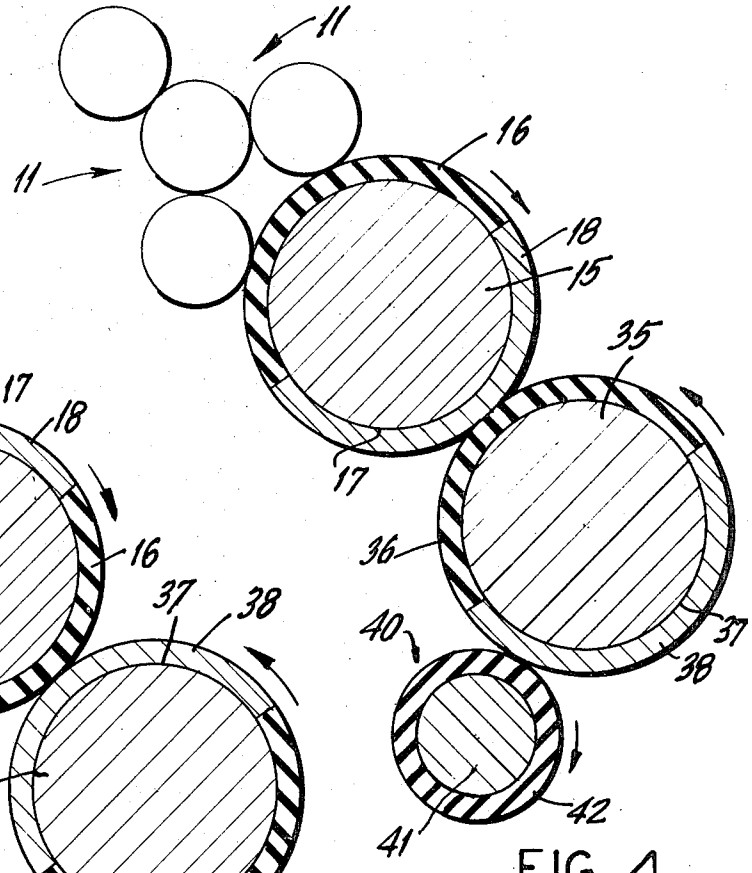


FIG. 4

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SHEET FEED PRESS FOR PRINTING SMALL SIZE SHEETS ON BOTH SIDES SIMULTANEOUSLY

This invention relates to a sheet feed press for printing sheets simultaneously on both sides.

An object of this invention is to provide a printing press of the character described using only one inking system to ink both a front printing plate and a back printing plate and print both images on rubber rollers and finally print both sides of sheets simultaneously, pressed rubber to rubber, thereby necessitating only one ink fountain and one set of inkrollers for both sides of the sheet. With the present press, washing of the rollers, blankets and plates at the same time is facilitated.

Another object of this invention is to provide a highly simplified printing press construction of the character described which will ease the operation for the pressman to such extent that he will have no more difficulty printing both sides of the paper sheet than he would have printing one side only on a usual offset press.

With this new press the operator seeing the print on one side of the paper, will know that the other side is being printed with the same inkflow that supplies ink for printing the first side.

Because of the relatively small size and the texture of cards, envelopes or other sheets to be printed, in addition to the "rubber to rubber impression" whereby the sheet is under full control during the entire printing cycle, there is no need for grippers to pull the sheet to be printed, through the press as on other sheet fed printing presses, and they are therefore eliminated. For that reason this press is capable of printing sheets with little or no flexibility, such as stiff cardboard or plastic sheets. All modern printing presses have cylinder steel "bearers" to stabilize and control the impression between the cylinders. These "bearers" are part of the cylinders and situated on each end of said cylinder around the circumference.

While the press is printing, the "bearers" of one cylinder are in contact under pressure with the "-bearers" of the opposing cylinder, as plate cylinder is against blanket cylinder or blanket cylinder is against impression cylinder.

Because of this (steelbearers against steelbearers) the cylinders cannot be moved closer or away from each other for more or less impression on prior presses.

Because this invention consists of rubber rollers instead of steel cylinders it is possible to increase or lessen the pressure against the bearers on all three cylinders and thereby saving costly time adjusting the pressure by adding or subtracting sheets of paper under the blanket or printing plate.

This adjustment is done by moving the middle rubber roller closer or further away from the two other rollers both of which rotate on fixed axes.

This middle roller is attached to an adjustable lever on each side which is attached to the bearing which holds the top roller.

This lever is split between the top and middle roller by two threaded rods of different pitch and held together by a nut with the two matching different threads, and a lock nut for holding the pressure once it is set. This arrangement permits the adjustment of pressure between the two rollers.

This adjustment will remain unaffected when the pressure adjustment between the middle roller and the lower roller is changed because the lever swings on the axis of the top roller.

This adjustment (center roller against the lower roller) is set by a screw behind a large electro-magnet which is activated whenever a sheet is fed from the feeder to the printing unit, thereby pulling the lever toward it and making contact between the center roller and the lower roller.

Unless a sheet is fed into the printing unit the electromagnet is deactivated and a spring will pull the lever away and thereby move the center roller off impression.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the construction hereinafter described, and of which the scope of invention will be indicated in the following claims.

In the accompanying drawings in which is shown various illustrative embodiments of this invention,

FIG. 1 is a perspective view of the press embodying the invention;

FIG. 2 is an end view of the press with the inking rollers omitted;

FIG. 3 is an enlarged cross-sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a transverse, vertical cross-sectional view of the structure shown in FIG. 1;

FIG. 5 is a view similar to FIG. 4, but showing the first two rollers moved 180° from the position of FIG. 4.

FIG. 6 is a diagramatic view illustrating control of the electro-magnet by movement of the sheet to be printed.

Referring now in detail to the drawing, 10 designates a printing press embodying the invention. Said press comprises inking rollers 11 receiving ink in a usual manner. The press has side frames 12 and 13 on which the inking rollers 11 are rotatably mounted.

Supported by said frames 12, 13 for rotation is a shaft 14 carrying a coaxial steel roller 15 having a rubber outer layer 16. The shafts 14 rotate in fixed bearings on the frame. The rubber layer 16 has a cutout 17 which extends 180° circumferentially but terminates short of the ends of the rubber layer. The cutout exposes the steel cylindrical roller. Attached to the exposed semi-cylindrical surface of the steel roller is a printing plate 18 having a circumferential extent of any size up to 180°.

Rotatably mounted on axle 14 at one side of the press (the near side looking at FIG. 1) is an impression lever or arm 20. The arm 20 is shown on one side only of the press. Arm 20 comprises a ring portion 21 journalling the shaft 14. Extending from ring 21 is a radial stem 22 having a threaded end 23. On threaded portion 23 is a lock nut 24 (FIG. 3). Also on threaded portion 23 is screwed a turnbuckle nut 25. Said nut 25 has an upper inner thread 26 having a pitch similar to the pitch of screw portion 23 and similar to the pitch of lock nut 24. Said turnbuckle nut 25 has a lower inner threaded portion 27. Screwed into thread 27 is a threaded end 28 of a rod 29. The threads of portions 27, 28 is of a lesser pitch than the pitch of threaded portions 23, 26 and of the internal threads of lock nut 24. Rod 29 is aligned with stem 22. Extending from rod 29 is a ring 30 from which extends a rod 31 coaxial with rod 29. Thus, members 20 can rotate about the fixed common axis of shafts 14 and roller 15.

Rotatably mounted on and in ring **30** of member **20** is an axle **34**. There are two coaxial axles **34**, carrying a coaxial steel cylindrical roller **35** therebetween on which is fixed a rubber layer **36**. At the far side of the press is an arm (not shown) similar to arm **20** except that arm portion **31** may be eliminated. The opposite axle **14** is journalled in ring **21** of the other arm **20**, and the other axle **34** is journalled in the ring **30** of said other arm. Rollers **15**, **35** have interengaging or meshing gears **15***a*, **35***a* respectively. The gears **15***a*, **35***a* are similar. The outer diameter of rubber layers **16**, **36** are similar.

The layer **36** has a cut-out **37** of any angular extent up to 180° circumferential extent and terminating short of the ends of said rubber layer. Fixed to the steel roller and disposed within cut-out **37** is a printing plate **38** of any size up to 180° circumferential extent. The cut-out **37** is so located that the plate **18** will contact only the rubber **36** of roller **35**, and the plate **38** will only contact the rubber **16** of roller **15**. Swinging of the arms **20** will not move the roller **35** out of contact with respect to roller **15**.

Shafts **34** may move about the axis of shafts **14** and rotate about their own axes.

Rotatably mounted on frames **12**, **13** in suitable bearings is a roller **40**, comprising a steel inner cylinder or drum **41** covered by a rubber layer **42**. Layer **42** has annular grooves **43** located at the end of plate **38**. The smaller roller **40** has a diameter, and hence a circumference, half the size of rollers **15**, **35**. Roller **40** has a gear **45** which meshes with gear **35**a. One revolution of gear **35***a* causes two revolutions of gear **45**. Hence roller **40** turns twice for one revolution of each of rollers **15**, **35**.

A coil tension spring **50** is interposed between the lower end of arm **20**, at the rear side of the press, and an abutment **52** on the press frame. Screwed to the frame is a screw **53** which adjustably engages the lower end of an electro-magnet **54** having an upper end adjacent the outer end of arm portion **31**.

The sheets **55** to be printed are fed between rollers **35**, **40** in the direction shown by the arrow in FIG. 5. Any suitable switch may be provided, adapted to close when the paper is fed between the rollers, to energize a circuit for the electro-magnet **54**, to swing the arm **20** downwardly and press the rollers **15**, **35** together.

After the sheet passes through and beyond the rollers, the switch opens and the electro-magnet is deenergized and spring **50** raises the roller **35** from the roller **40**, slightly.

It will now be understood that the one inking system **11** supplies ink for printing on both sides of the sheets **55**. The inking rollers ink the plate **18** and the rubber layer **16**.

The rubber layer **16** is inked during **1/2** revolution of roller **15**. During the second one-half revolution of roller **15**, plate **18** is inked by the inking system **11**. During this time, the plate **38** is inked by rubber layer **16**. During the following one-half revolution, the plate **18** prints on the rubber layer **36** and the plate **38** prints on layer **42** of roller **40**. On the final one-half revolution the actual printing occurs, as the sheet of paper **55** passes between rollers **35** and **40** and receives the images from rubber layer **36** and rubber layer **42**. Roller **40** makes twice as many revolutions as rollers **15** and **35**, which permits it to receive the impression from plate **38** every other revolution and print that image on the underside of the paper on the next revolutions of roller **40**.

Unlike other sheet fed printing presses, there are no grippers necessary because the sheet is under constant pressure between the rollers **35**, **40**.

The plate **18** prints on rubber **36** which prints on the upper side of the sheet while the roller **40** prints on the underside of the sheet.

The rollers **15** and **35** may be 3 inches in diameter, 12 inches long with 4 inch long and 1 inch diameter shanks or shafts. The gears **15***a*, **35***a* may be detachable.

The rubber layers or coatings **16**, **36** may be ¼ inch in thickness. The cut-out may be 10½ inches long and 5½ inches in curvature. The printing plates may be glued on the steel cores of the rollers. The printing plates used for this press are relief plates with the printing area higher than the non-printing area. The printing plates may be made of Dycril, rubber, zinc or other suitable material.

The maximum printing area may be 10 inches by 5 inches.

Roller **40** may have a stainless steel core **41** of same length as rollers **15**, **35**, and only be 1¼ inches in diameter. The shanks or shafts on roller **41** may be the same as rollers **15**, **35** in length and diameter with a detachable gear one-half the circumference of the gears on rollers **15**, **35**. The rubber layer **42** may also be ¼ inch in thickness with the grooves **43** of ¼ inch width, located about 1 inch from each end. These 1 inch wide rubber ends correspond with the ends of the rubber layers **16**, **36** on rollers **15**, **35**, beyond the cut-outs, and act as "bearers" during the printing cycles. The ¼inch wide grooves keep the ink from roller **35** from entering the printing surfaces of layer **42**, of roller **40**.

The "on", "off" impression lever or arm **20** and the opposite arm (not shown) carry the roller **35**.

By loosening the lock nuts **24**, and manipulating the turnbuckle nuts **25** of both impression levers, the degree of contact between rollers **15**, **35** may be adjusted. This is so because the pitch of screw threads **26** is greater than the pitch of screw threads **27**. However arm portions **31** and **22** remain in alignment. The degree of contact between rollers **35** and **40** is controlled by the screw **53**.

Referring now to FIG. **6**, it will be seen that when the sheet **55** is about to enter between the rollers, **35**, **40**, switch **70** will close to energize electro-magnet **54** through any suitable circuit **71**. When the paper passes through the rollers, switch **70** opens to deenergize the electro-magnet.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative.

With the present press a metal surface plate cannot be used as there is no provision to print "wet" offset on this press. Also this press cannot print different colors on the two sides.

Due to elimination of the grippers, the sheet can be printed on its entire surface on both sides. This cannot be done on a press with grippers because of the gripper bite on the front end of the sheet.

I claim:

1. A printing press comprising inking means, a first roller positioned to receive ink from said inking means, said roller having a part cylindrical printing plate portion and a part cylindrical coextensive ink roller portion, a second roller having a part cylindrical printing plate portion and a part cylindrical blanket portion coextensive therewith, means to maintain said first and second rollers, in rolling contact, coextensively, said rollers being of the same diameter, means to connect said rollers for rotation about their axes in opposite directions at the same rate of rotation, with the printing plate portion of the first roller contacting the blanket portion of the second roller and the ink roller portion of the first roller contacting the printing plate portion of the second roller, and a third roller comprising an outer blanket all around and being coextensive with said second roller and of a diameter half the diameter of the first or second rollers, means to connect said third roller for rotation about its axis, two revolutions for each revolution of the first or second rollers, in contact with said second roller, whereby ink from the inking means will ink the ink roller portion of the first roller during the first half revolution of said first roller, and will ink the printing plate portion of the first roller during the second half revolution of the first roller, and the inked ink roller portion of the 1st second roller during the will ink the printing plate portion of the second roller during the second half revolution of the first roller, and the printing plate portion of the first roller will impress the blanket portion of said the next half revolution of the first roller, and the printing plate portion of the second roller will impress the blanket of the third roller during said next half revolution of said first roller, during which time said third roller makes a full revolution, and whereby said blanket portion of said second roller and said blanket of said third roller may print opposite sides of a sheet passing between said second and third rollers during a following half revolution of said first roller, during which time the third roller makes another complete revolution.

2. The combination of claim 1, and means to rotate the second roller about the axis of the first roller.

3. The combination of claim 1, and means to adjust the distance between the axes of said first and second rollers.

4. The combination of claim 1, means to move the second roller in one direction, about the axis of the first roller and means to move the second roller in an opposite direction about the axis of the first roller.

5. The combination of claim 4, and means to limit movement of the second roller in one of said directions.

6. The combination of claim 1, means to rotate the second roller about the axis of the first roller, and means to vary the distance between the axes of said first and second rollers.

7. The combination of claim 1, said ink roller portion of the first roller comprising an outer layer of rubber, said outer layer having a cut-out terminating short of the ends of said layer, and said printing plate portion of the first roller being recessed into said cut-out and fixed to the first roller, said cut-out and printing plate terminating short of the ends of the roller.

8. The combination of claim 7, the blanket portion of said second roller comprising an outer rubber layer terminating short of the ends of said layer and having a cut-out, and said printing plate being recessed into said cut-out in the blanket portion of said second roller and fixed to said second roller.

9. The combination of claim 8, said blanket of said third roller comprising an outer layer of rubber.

10. The combination of claim 9, said outer layer of said third roller having annular grooves spaced from the ends of said outer layer and located at the ends of the printing plate portion of said second roller.

11. The combination of claim 1, each of said printing plate portions of said first and second rollers being 180° in circumferential extent.

12. The combination of claim 1, electro-magnetic means to move said second roller toward said third roller, and means controlled by a sheet passing between said second and third rollers, to control said electromagnetic means.

* * * * *