

Oct. 6, 1936.

W. M. O'HARA

2,056,205

CLAMPING DEVICE

Filed Nov. 16, 1932

2 Sheets-Sheet 1

Fig. 1

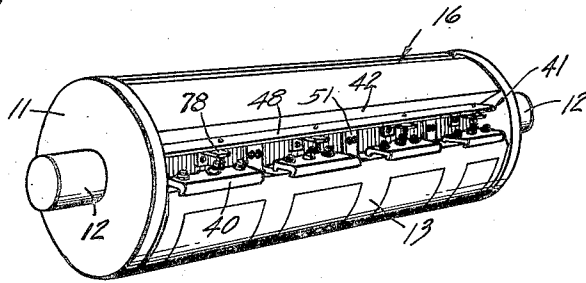
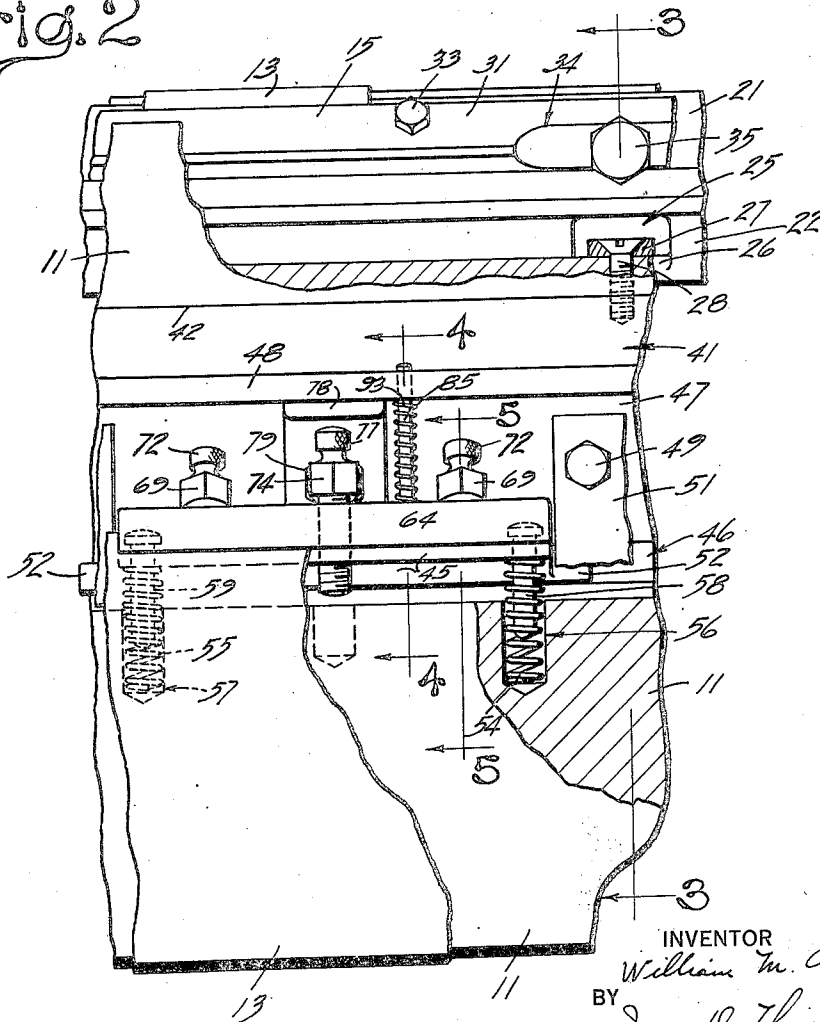


Fig. 2



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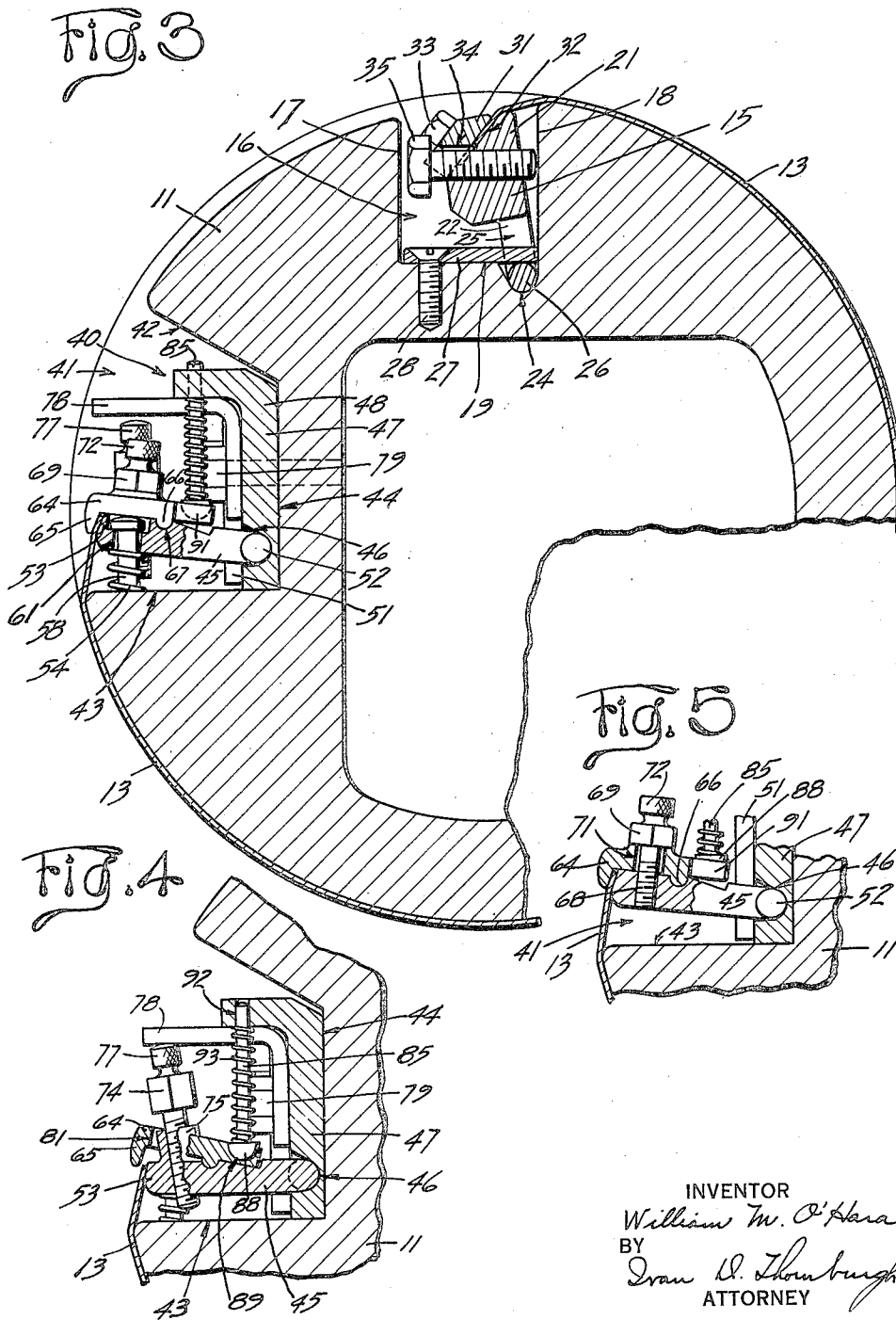
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,056,205

CLAMPING DEVICE

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Application November 16, 1932, Serial No. 642,857

6 Claims. (Cl. 101—415.1)

The present invention relates to lithographing presses and has particular reference to clamping devices for holding a zinc printing plate or other flexible sheet in position on the peripheral surface of the plate cylinder of the press.

The principal object of the present invention is the provision of yieldable clamping devices for tautly holding such a printing plate or other flexible sheet in position on the plate cylinder without stretching or straining the plate.

An important object of the invention is the provision of adjustment elements for clamping devices of the character described which effect variation in the holding action of the clamping devices.

An important object of the invention is the provision of yieldable clamping jaws which are pivotally mounted in a plate cylinder and which hold a printing plate in printing position, the jaws being bodily moved on their pivotal mountings to pull the plate taut, one jaw being pivotally mounted on the other jaw and held against pivotal movement when clamping the plate.

An important object of the invention is the provision of yieldable printing plate clamping devices which may be manually and bodily moved to receive the plate and which, when released, draw the plate into its printing position.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a perspective view of a plate cylinder embodying the present invention;

Fig. 2 is a fragmentary elevation of such a cylinder on an enlarged scale shown partly in section and illustrating one unit of the clamping device;

Fig. 3 is a transverse sectional view partly broken away as taken substantially along the line 3—3 in Fig. 2; and

Figs. 4 and 5 are fragmentary sectional views taken substantially along the lines 4—4 and 5—5 in Fig. 2 and showing the parts in different positions.

In printing in a lithographing press the printing plate, which in common practice is an etched zinc sheet containing the required design, is carried on the outer surface of a plate cylinder.

The ink or color for the printing operation is applied to this plate in the usual manner and is transferred to the surface to be printed in various ways according to common practice, the

details of which are not important as far as the present invention is concerned. Such a printing plate is removably secured to the cylinder, usually with a number of clamping devices.

It is essential that such a printing plate be exactly positioned on the cylinder so that every part of its surface will accurately register either with corresponding impressions of other printing plates when multiple color work is to be produced, or with exact areas on the surface being printed so that there will be no distortion or lack of sharpness in the final printing design. The universally used zinc plate is soft and easily stretched and when applied to the peripheral surface of the plate cylinder and drawn taut by the usual clamping devices stretching and distorting of the sheet often results.

It is to overcome such tendencies that the present invention is particularly concerned and this is effected in a simple and efficient manner. The invention contemplates the use of yieldable clamping devices of improved construction. Such construction may comprise as a preferred form one or more units or pairs of separable clamping jaws all pairs of which clamp along one edge of the sheet or zinc plate, a jaw of each pair being secured in sheet holding position by screws. Each unit is supported on spring cushions.

The other end of the sheet or zinc plate is rigidly and adjustably held on the plate cylinder in any suitable manner, a screw held clamp of well known construction such as is illustrated in the drawings being satisfactory. The zinc plate when so mounted on the peripheral surface of the cylinder and with its ends held between the rigid and the yieldable clamps is drawn just tight enough to make the printing plate taut and correctly placed for printing, but this spring holding action is not sufficient to stretch the plate.

The drawings illustrate a preferred embodiment of the invention, and as shown the sheet clamping devices, are mounted in a plate cylinder 11 (Figs. 1 and 3) having trunnions 12 which may be journaled in suitable bearings of a lithographing press. The zinc plate or other sheet is designated by the numeral 13 and when in printing position partially surrounds the outer or curved surface of the cylinder 11.

One end of this printing plate is securely held in a rigid clamping unit 15 (Figs. 1, 2 and 3) which is disposed entirely within the cylindrical wall of the cylinder 11, being located in a recess 16. Recess 16 is cut longitudinally of the cylinder and extends substantially its entire length

and is provided with parallel walls 17, 18 and an inner connecting wall 19. The unit 15 includes a clamping bar 21 which extends substantially the entire length of the recess 16.

5 The bar 21 at its inner side is provided with an extension 22 which terminates in an inner rounded edge which is seated within a groove 24 formed in the wall 19 of the cylinder. The extension 22 is slotted at intervals to provide
10 spaced openings 25 and one wall of each slot is rounded and cooperates with the rounded inner edge of the extension to provide a series of connecting cylinder bridges 26 which act as trunnions to permit pivoting or rocking of the unit
15 15 in its seat 24.

The clamping bar 21 is retained in its recess 16 with the rounded edge of its extension section 22 movably held in the groove 24 by small plates 27 held by screws 28 against the wall 19 of the recess. The unattached end of each plate projects into one of the slots 25 and rests against the bridge part 26 at that position.

20 A clamping bar 31 is mounted on the bar 21 and one face cooperates with a face 32 formed on the bar 21 when holding the printing plate 13. The bar 31 is of the same length as the bar 21, this being as great as and preferably greater than the width of the printing plate 13. The bar members 21, 31 are held in plate clamping position by cap screws 33 threadedly secured in the
30 bar 21.

The jaw 31 is recessed at intervals as at 34 to provide clearance openings for adjusting screws 35 threadedly engaged in the bar 21, the inner ends of the screws bearing against the recess wall 19. These adjusting set screws determine the pivotal location of the rigid clamping unit 15 which in turn determines the exact location of the plate 13 on the cylinder 11.

40 The other end of the printing plate 13 is securely held in position by one or more yieldable clamping units 40 (Figs. 1 and 3) located in a longitudinal slot 41 cut into the side wall of the cylinder 11 and extending nearly its entire length. This recess 41 has an inclined wall 42, an opposite straight wall 43 and an inner wall 44. Four of these units 40 are illustrated in the drawings, the units being of identical construction.

50 Each clamping unit 40 includes a clamping plate 45 which, like the bar 21 of the unit 15, is rounded at its inner edge and is mounted to permit oscillating or rocking movement. This rounded edge rests or moves within a longitudinal groove 46 formed in a wall 47 of a right angled bracket 48. The bracket 48 extends longitudinally of the slot or recess 41 and is of substantially the same length.

55 The bracket is held securely against the recess wall 44. Bolts 49 retain blocks 51 in clamping position against the bracket wall 47, a block 51 being located between each clamping unit 40. One end of the block extends down over projecting cylindrical sections 52 extending on both sides of each plate 45. These cylindrical sections in their mountings act as trunnions for the clamping unit. The blocks hold the clamping plates 45 in pivotal position within the groove 47 for this purpose.

70 The forward or outer edge of each clamping plate 45 is formed with an inclined clamping surface 53 which adapts the plate for use as one of the holding jaws of the clamping unit. The outer or jaw edge of each plate 45 rests on a pair of springs 54, 55 (Fig. 2) which are par-

tially enclosed within bores 56, 57 cut in the cylinder adjacent the recess wall 43. Each spring 54, 55 is held in proper plate supporting position on pins 58, 59 which project into the center of the spring coils, these pins being loosely carried in bores 61, (Fig. 3) formed in the plate 45.

The other clamping jaw of each clamping unit 40 is formed as a plate 64 which has an outer projection or hook 65 for cooperating with the jaw surface 53 of the plate 45. Each plate 64 is pivotally mounted on its associated plate 45 and for this purpose is formed with a rounded projecting ridge 66 which rests in a correspondingly shaped groove 67.

15 The edge of the printing plate 13 when clamped in the unit 40 is tightly held between the jaw parts 53, 65 by a pair of screws 68 which threadedly engage in the plate 45. Each screw 68 (Fig. 5) has an enlarged square shoulder 69 which engages the plate 64, the screw passing through a clearance opening 71 formed therein. This square surface allows for tight clamping by a wrench. Each screw is also preferably formed with a knurled head 72 which permits easy rotation of the screw to get it into position for final clamping.

20 When the printing plate is clamped in both clamping units 15 and 40 the springs 54, 55 of the latter pull and hold the sheet taut on the surface of the cylinder, this position being illustrated in Figs. 1 and 3. The holding action of the springs is sufficiently strong to obtain the required tautness in the sheet without stretching it.

25 When a printing plate or sheet is to be removed from the cylinder or placed thereupon, it is necessary to overcome this spring action and provision is made for doing this in a simple manner. The several clamping plates 45 may be independently rocked on their pivotal mountings and their jaw edges moved closer to the wall 43 of the recess 41. This is accomplished in each unit by a screw 74 (Figs. 2 and 4) which is threadedly engaged in a boss 75 formed on each plate 45 adjacent its clamping surface 53.

45 A knurled head 77 of the screw 74 is first moved into engagement with one leg of an angle plate 78 which is mounted in the bracket 48 being held against the wall 47 of the bracket by a cap screw 79. These screws 79 may also extend into the cylinder wall 44 and hold the bracket 48 within the recess 41. The angle plate 78 prevents further movement of the screw and with its head so engaged further turning of the screw in its threaded seat 75, this turning then being done with a wrench or other suitable tool, forces the free end of the clamping plate 45 toward the wall 43 of the recess 41.

This rocks the plate on its pivotal mounting in the bracket 48 and overcomes the force of the springs 54, 55 which are further compressed as the plate 45 approaches the recess wall. When an adjustable clamping unit 40 is in the position illustrated in Fig. 4 its pulling action on the printing plate 13 is relieved and the latter is then ready for removal from the clamping jaws.

65 While the screws 74 hold the plates 45 in the position just described the screws 68 are loosened and the jaw 65 of the plate 64 is then free to move away from the clamping surface 53 of the plate 45. Provision is made for positively moving the jaw into open position and in such movement the plate 64 is rocked on its pivotal mounting 66, 67 into open position, as illustrated in Fig. 4. This releases the printing plate from the holding jaws.

Each plate 64 is slotted at 81 to allow for clear-

ance of the boss 75 and the screw 74 and the position of the plate 64 is thus not affected by the position of the plate 45.

A spring held pressure pin 85 cooperates with each plate 64 to positively rock it into open position when the holding screws 68 are released. The pin 85 is provided with a semi-spherical head 88 which rests within a cup shaped recess 89 formed in a lug 91 projecting inwardly from the rear edge of the plate 64. The end of the pin 85 is loosely held within a bore 92 passing through the bracket 48. A spring 93 surrounds the pin 85 and provides the moving power. This spring is interposed between the bracket 48 and the head of the pin.

In locating a printing plate 13 on the cylinder 11 one edge of the plate is first clamped between the bars 21 and 31 of the rigid clamping unit 15 by means of the cap screws 33. The plate is then drawn over the surface of the cylinder and its opposite edge is brought around into the position illustrated in Fig. 4 where it is placed adjacent and in engagement with the jaw surfaces 53 of the plates 45. The screws 68 of each clamping unit 40 are then tightened, this action rocking the respective plates 64 against the action of their springs 93.

With the edge of the printing plate 13 securely clamped between the jaw parts 53, 65, the screw 74 of each unit 40 is rotated to permit the springs 54, 55 to rock the plate 45 and pull the printing plate 13 into taut position on the cylinder. After this position is reached the screws 74 are further rotated to move their heads 77 out of engagement with the angle plates 78.

To accurately adjust the printing plate 13 to printing position, in the event that it has not been properly placed on the cylinder, and so that its design will be in proper register with the area of the surface to be printed, the rigid clamping unit 15 is shifted forward or back by adjustment of the screws 35, the springs 54, 55 of the yieldable units 40 always taking up any slack and holding the printing plate in engaged position on the cylinder 11.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a plate cylinder for a lithographing press, the combination of clamping jaws pivotally mounted in said cylinder, auxiliary jaws pivotally mounted on said clamping jaws, said jaws collectively holding one edge of a printing plate superimposed on said cylinder, spring devices partially embedded in a wall of said cylinder and operating against said clamping jaws for pivotally moving them away from the wall of said cylinder and for pulling said printing plate in taut position, and means threadedly carried in said clamping jaws and adapted for effective operation opposed to said spring devices for pivotally moving said jaws in the opposite direction to relieve the pull on said plate, said threaded and pivoting means also holding said jaws in said relieved position.

2. In a plate cylinder for a lithographing press, the combination of a plurality of yieldable clamping units for holding a printing plate, said units

being insertable end to end within a slot formed in the plate cylinder, each unit comprising a bracket secured to a wall of the said slot, clamping jaws pivotally mounted on said bracket, auxiliary jaws pivotally mounted on said clamping jaws, said jaws holding one edge of the printing plate when it is superimposed on said cylinder, spring devices partially embedded in a wall of said cylinder slot and effective against said clamping jaws for pivotally moving the jaws in the said bracket to pull said printing plate taut, means threadedly movable in said clamping jaws and engagable with an extension on said bracket for opposing said spring devices and for relieving the pull on said plate, means for holding said auxiliary jaws in clamping position on said clamping jaws, and means opposed to said clamping means for rocking said auxiliary jaws on their pivotal mountings to place the clamping and auxiliary jaws in open position during the relieved condition of the printing plate to permit removal and insertion of said plate.

3. In a plate cylinder for a lithographing press, the combination of a jaw element pivotally mounted in said cylinder for holding one edge of a printing plate partially surrounding said cylinder, a bracket member secured in said cylinder, a second jaw element pivotally mounted in said bracket member for holding the opposite edge of said printing plate, spring means interposed between said cylinder and the latter mentioned jaw element and normally exerting tension on said printing plate, means engaging the latter mentioned jaw element and said bracket member for releasing the spring tension on said plate to permit engagement and release of the latter with respect to said jaw element, means engaging the first mentioned jaw element and said cylinder for regulating the tension exerted by said spring means on said plate, means for releasing the latter mentioned jaw element, and means disposed between said latter mentioned jaw element and said bracket member and cooperating with said releasing means to maintain such jaw element in releasing position.

4. In a plate cylinder for a lithographing press, the combination of a plurality of spaced jaw elements each pivotally mounted on said cylinder for holding an edge of a printing plate partially surrounding said cylinder, a plurality of bracket members secured in said cylinder, a second plurality of jaw elements each pivotally mounted on one of said bracket members for holding the opposite edge of said printing plate, spring means interposed between said cylinder and each of the latter mentioned jaw elements, and normally exerting tension on said printing plate to hold the latter taut, means engaging each of the latter mentioned jaw elements and its respective bracket member for releasing the spring tension on said plate with respect to said latter mentioned jaw elements, means engaging each of the first mentioned jaw elements and said cylinder for regulating the tension exerted by said spring means on said plate, means for releasing the latter mentioned jaw elements, and means disposed between said latter mentioned jaw elements and said bracket members and cooperating with said releasing means to maintain such jaw elements in releasing position to permit the removal and insertion of said printing plate.

5. In a plate cylinder for a lithographing press, said cylinder having peripherally spaced longitudinally extending recesses therein, the combination of a jaw element pivotally mounted in

one of said recesses in said cylinder for holding one edge of a printing plate partially surrounding said cylinder, a second jaw element pivotally mounted in another of said cylinder recesses for
 5 holding the opposite edge of said printing plate, spring means disposed entirely in said last mentioned recess and interposed between said cylinder and the latter mentioned jaw element and normally exerting flexible tension on said printing
 10 plate to yieldably draw the same taut relative to said cylinder, means also located in said last mentioned recess and engaging the latter mentioned jaw element for releasing the spring tension on said plate to permit engagement and re-
 15 lease of the latter with respect to said jaw element, and means engaging the first mentioned jaw element and said cylinder for regulating the tension exerted by said spring means on said plate.

20 6. In a plate cylinder for a lithographing press, said cylinder having peripherally spaced longitudinally extending recesses therein, the combina-

tion of a plurality of spaced jaw elements each pivotally mounted in a said recess on said cylinder for holding an edge of a printing plate partially surrounding said cylinder, a second plurality of
 5 jaw elements pivotally mounted in another of said recesses on said cylinder for holding the opposite edge of said printing plate, spring means disposed entirely in said last mentioned recess and interposed between said cylinder and each of the latter
 10 mentioned jaw elements and normally exerting flexible tension on said printing plate to yieldably hold the latter taut relative to said cylinder, means also located in said last mentioned recess
 15 and engaging each of the latter mentioned jaw elements for releasing the spring tension on said plate with respect to said latter mentioned jaw elements, and means engaging each of the first mentioned jaw elements and said cylinder for regulating the tension exerted by said spring means on said plate.

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