

Aug. 6, 1940.

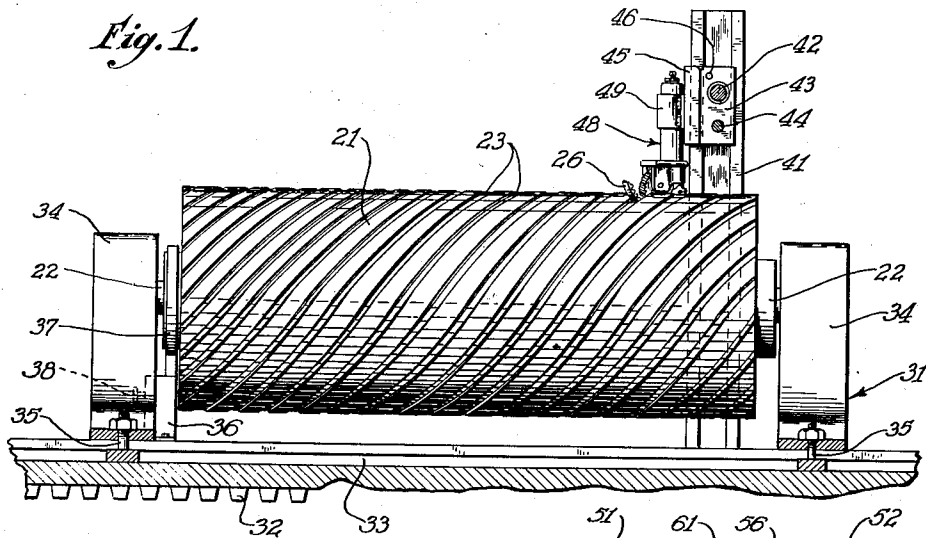
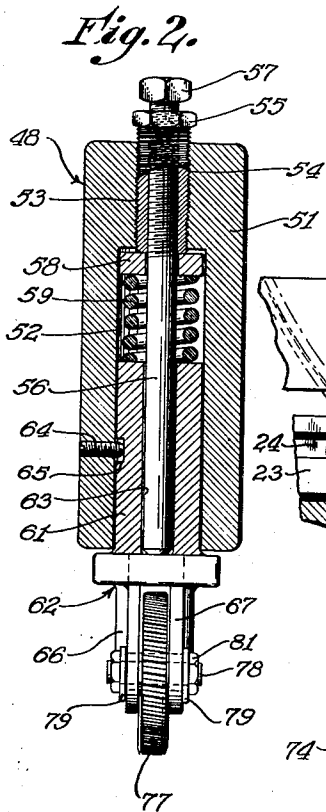
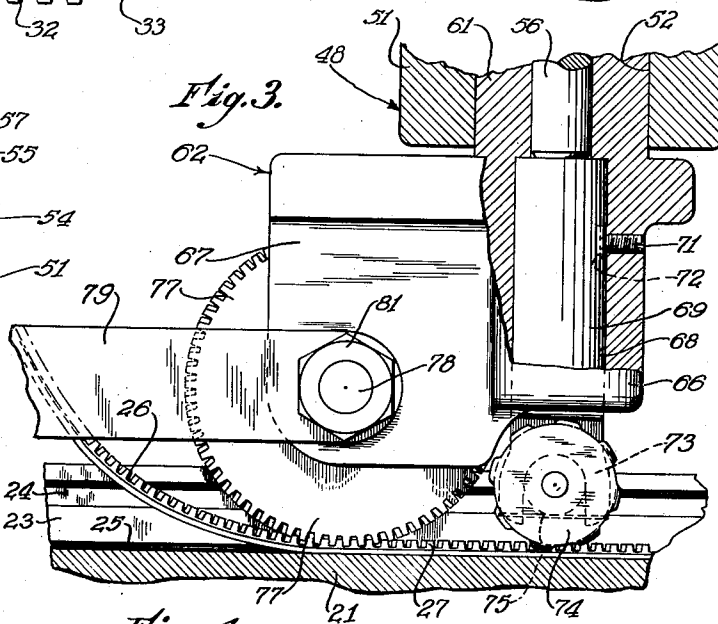
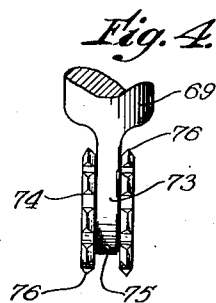
W. F. BRÜGMANN

2,210,749

PRINTING PLATE MOUNTING

Filed April 25, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5.

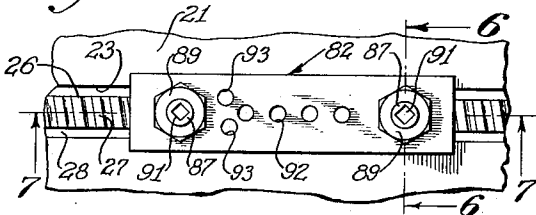


Fig. 6.

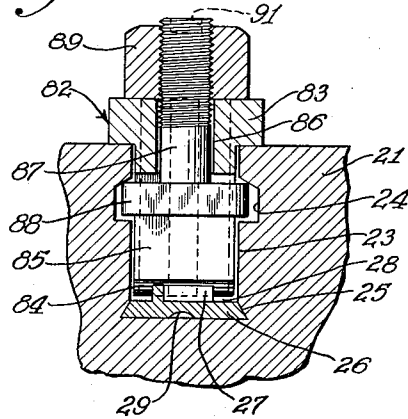


Fig. 7.

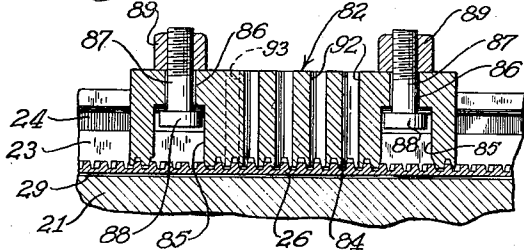


Fig. 8.

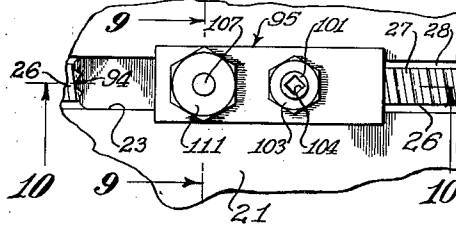


Fig. 9.

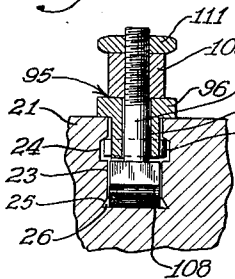


Fig. 11.

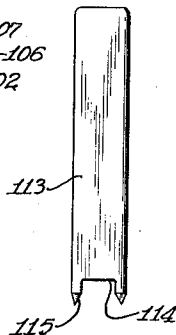


Fig. 10.

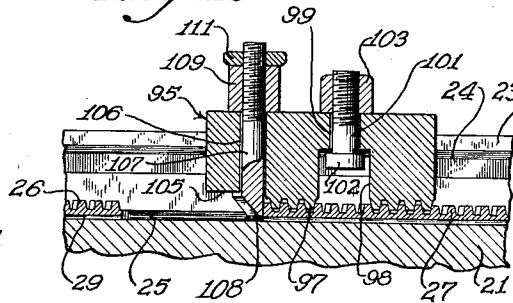


Fig. 13.

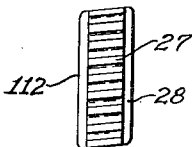
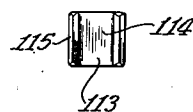


Fig. 12.



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2,210,749

PRINTING PLATE MOUNTING

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Application April 25, 1936, Serial No. 76,454

7 Claims. (Cl. 101—388)

This invention relates in general to printing plate mounting devices, and more particularly to a novel rack adapted to be secured in grooves in a printing press plate cylinder or other supporting base member, and to the method and apparatus for inserting and repairing such a rack.

While the instant invention is clearly applicable to printing press plate cylinders and to plate supporting bases for flat bed presses, it is shown and described herein in conjunction with the former, since its advantages in such an installation are more readily apparent.

The prior art discloses the cutting of helical grooves in the circumferential surface of printing press cylinders within which register hooks are adapted to be mounted, and the provision of a rack or racks therein with which driving means, such as gears or worms, in the hooks may cooperate to move the hooks longitudinally of the grooves into and out of clamping engagement with the usual printing plates. These prior art racks, however, and the methods employed in mounting them in the grooves in the cylinders have certain practical disadvantages which it is the purpose of the instant invention to overcome.

Heretofore the racks have been pushed or pulled longitudinally into T-slots cut adjacent the bottom of the grooves. Since the racks are subjected to great strain by the driving elements of the hooks both in their initial registering movements, and during a run by the action of the impression cylinders on the printing plates, undue wear of certain portions of the racks and breakage of some of the teeth thereof naturally follow in the course of time. In the prior art devices it is then necessary to remove the entire rack from the full length of the groove, even though but a small portion thereof has been damaged. To do this, the plate cylinder must be taken out of the press and shipped to the factory where the necessary tools and equipment are available to do the work, and, in the meantime, the press is completely out of commission.

A principal object of my invention, therefore, is the provision of a novel rack, method and apparatus for inserting the same in a groove in a printing plate supporting member, such as a plate cylinder, from the top of the groove, and riveting it in the bottom portion thereof.

A further object of the invention is the provision of such a rack which permits the repairing of any desired portion thereof without necessitating the removal from the press of the plate supporting member in which the rack is mounted.

Another important object of the invention is

the provision of a novel method and apparatus for repairing the damaged portion or portions of such a rack by removing such damaged portions only and replacing them with new pieces of rack of the same size.

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

In the drawings,

Fig. 1 is an elevational view, with parts broken away, of a printing plate cylinder and apparatus for inserting racks, embodying the features of the instant invention, in helical grooves in the cylinder;

Fig. 2 is a front elevational view, with the upper portion in vertical section, of the tool holding device of Fig. 1;

Fig. 3 is a side elevational view, partly in section, of the lower portion of the device of Fig. 2 in operative position in a groove of the cylinder;

Fig. 4 is a detail rear elevation of the riveting roller;

Fig. 5 is a top plan view of the repair drill jig mounted in a groove of the cylinder;

Fig. 6 is a vertical sectional view taken substantially on the line 6—6 of Fig. 5;

Fig. 7 is a vertical section taken substantially on the line 7—7 of Fig. 5;

Fig. 8 is a top plan view of the trimming tool mounted in a groove of the cylinder;

Figs. 9 and 10 are vertical sectional views taken substantially on the lines 9—9 and 10—10, respectively, of Fig. 8;

Fig. 11 is a front elevational view of the repair riveting tool;

Fig. 12 is a bottom plan view of the tool of Fig. 11; and

Fig. 13 is a top plan view of a repair piece for the rack.

Referring more particularly to the drawings, reference numeral 21 indicates a printing press plate supporting cylinder of well-known construction having end bearing members 22 (Fig. 1). A plurality of spaced, parallel, helical grooves 23 are cut in the circumferential surface of the cylinder 21 in the usual manner, and are preferably disposed at an angle of approximately 45 degrees to the longitudinal axis of the cylinder.

The grooves 23 are constructed to receive any suitable form of plate holding devices, such as the printer's register hook disclosed in my co-pending application for U. S. Letters Patent, Serial No. 77,473 filed April 25, 1936, and are pro-

vided on each side adjacent the top with longitudinal, under-cut recesses 24 (Figs. 3, 6, 9 and 10) within which the locking elements of the plate holding devices (not shown) are adapted to be positioned. At their lower ends, the side walls of the grooves 23 are cut back or outwardly at a slight angle and for a short distance at 25 to provide a slightly laterally enlarged recess at the bottom of the grooves within which are mounted racks 26 adapted to be engaged by the driving gears of the printer's register hooks.

The racks 26 are provided with teeth 27 on their upper surfaces formed integrally therewith, and with longitudinal, marginal recesses 28 on either side of and extending slightly below the root line or bottom portion of the teeth 27 (Figs. 5 and 6). When the racks 26 are secured in place in the bottom of the grooves 23, these marginal recesses 28 form gutters along the sides of the teeth 27 for the accumulation and drainage of foreign matter, and also facilitate the securing of the racks within the grooves 23 in a manner to be later described. The racks 26 are also preferably provided with a substantially centrally located, longitudinal recess or groove 29 in the bottom surface thereof for a purpose which will be explained hereinafter.

For positioning the racks 26 in the grooves 23 and securing them in place, after the grooves have been cut in the printing plate supporting member 21, the following mechanism is provided. Any suitable device may be employed upon which to mount the printing plate supporting member, this being shown in Fig. 1 as an ordinary planer, indicated generally by reference numeral 31. The bed of the planer 31 is provided with the usual driving rack 32 on the under side, by means of which it is oscillated longitudinally (sideways in Fig. 1) in well-known manner, and with the usual longitudinal T-slots 33 in the upper surfaces thereof. A pair of trunnion supporting members 34 are secured to the bed of the planer 31 by the usual T-bolts 35 mounted in the T-slots 33. The trunnions 34 are adapted to receive the bearing members 22 of the plate cylinder 21 to rotatably support the cylinder on the planer bed with its axis disposed longitudinally thereof.

If it is desired, a tensioning means of some sort may be provided to resiliently urge the cylinder 21 to rotate in a clockwise direction, as viewed from the rear of the planer 31, or the right of Fig. 1, for a purpose to be later described. Such a tensioning means is shown in Fig. 1 as comprising a coil or clock spring device 36, mounted on the bed of the planer 31, and having one end of a flexible strap or cable 37 secured thereto, the other end of which is adapted to be wound around and secured in any suitable manner to one of the bearing members 22 of the cylinder 21. A handle 38 may be provided on the tensioning device 36 for winding up and controlling the operation of the spring therein.

The planer 31 is provided with the usual uprights 41, between which the bed is adapted to reciprocate, cross-brace 42 mounted between the uprights 41 for vertical adjustment, cross-slide 43 mounted for lateral adjustment on the brace 42 by screw 44, and tool holder 45 pivotally mounted at 46 on the slide 43 for forward swinging movements only relative thereto. A rack inserting tool, indicated generally by reference numeral 48, is adapted to be secured in any suitable manner, as by a U-clamp member 49, to the forward face of the tool holder 45.

Referring to Figures 2 to 4, the rack inserting

tool 48 comprises a cylindrical body portion 51, which is adapted to be engaged by the clamp 49. The body portion 51 is provided with an axial bore 52, having a decreased threaded portion 53 at its upper end. An internally and externally threaded collar or pressure member 54 is screwed into the reduced threaded portion 53 of the bore 52, and is provided with an angular head portion 55. A rod 56 is disposed within the longitudinal bore 52 of the body portion 51, and is threaded adjacent its upper end for engagement with the inner threads of the collar 54. The rod 56 terminates at its upper end in an angular head portion 57. A collar 58 is disposed within the bore 52 surrounding the rod 56, and is pressed upwardly against the lower end of the collar 54 by a compression coil spring 59, which also surrounds the rod 56, and is disposed within the bore 52. The lower end of the coil spring 59 abuts against the upper end of a vertical cylindrical extension 61 forming a part of a tool carrier, indicated generally by reference numeral 62.

The cylindrical extension 61 is disposed within the lower part of the bore 52, and is provided with a bore 63 through which the lower end of the rod 56 extends. The extension 61, and consequently the tool holder 52, is held against rotation relative to the body portion 51 in any one of a plurality of predetermined positions by a set-screw 64, which is mounted in the cylinder 51, and is adapted to engage within a selected one of a plurality of grooves 65 in the outer surface of the extension 61.

The grooves 65 may be spaced around the circumference of the extension 61 for a purpose which will be hereinafter explained. Each of these grooves is of such a width that the inner end of the screw 64 will firmly engage its side walls, and is of such a length as to permit limited vertical movement of the tool holder 62 relative to the body portion 51.

Referring more particularly to Figure 3, it will be seen that the tool holder 62 comprises a rounded rear end portion 66, disposed immediately below the extension 61, and a flattened forwardly extending yoke portion 67. The rear portion 66 is provided with a vertical bore 68, which is coaxial with the bore 63 in the extension 61. A cylindrical tool carrying member 69 is mounted for sliding movement within the bore 68. The upper end of the tool carrier 69 is adapted to be engaged by the lower end of the rod 56. The tool carrier 69 is held against rotation relative to the tool holder 62 by a setscrew 71 extending through the rear wall of the latter and engaging within a short vertical slot or groove 72 in the surface of the tool carrier 69. The slot 72 is of sufficient length to permit a certain amount of vertical movement of the tool carrier 69 relative to the tool holder 62.

It will be readily apparent that the cylindrical members 61 and 69 may be given an angular cross section in order to eliminate the necessity of using setscrews 64 and 71 to prevent rotation of these members. If this is done, however, other means must be provided for limiting the vertical movement of these members.

The lower end of the tool carrier 69 is formed to provide a narrow depending yoke portion 73 (Figs. 3 and 4). A double bladed riveting roller 74 is mounted on the lower end of the tool carrier 69, with the yoke portion 73 straddling the center portion thereof, and is removably held in place by a horizontally disposed pin 75 extending

through the lower ends of the yoke 73. Each of the blades of the riveting roller 74 is provided with a plurality of circumferentially spaced teeth 76. The teeth 76 are triangular in radial cross section (Fig. 4) with their outer surfaces being disposed at a lesser angle to a vertical plane than are their inner surfaces. The purpose of so shaping the teeth of the riveting roller 74 will be later described. A pressure roller gear 77 is rotatably mounted on a cross shaft 78 extending through and supported by the lower forward end of the yoke 67. Horizontal, forwardly extending guide bars 79 are mounted at their rear ends on the outer ends of the shaft 78 on either side of the yoke 67 and guide roller 77, and are held against the outer surfaces of the yoke by retaining nuts 81 threaded on the outer ends of the shaft 78.

The above described mechanism is used to insert and secure the racks 26 within the bottom portion of the grooves 23 in the cylinder 21 in the following manner:

The cylinder 21 is first mounted in the trunnions 34 with its axis extending longitudinally of the bed of the planer, as shown in Figure 1. The rack inserting tool 48 having been secured to the tool holder 45 of the planer and positioned directly above the axis of the cylinder 21, the setscrew 64 is unscrewed to permit the setting of the tool holder 62 at the same angle to a vertical plane defined by the axes of the cylindrical body portion 51 and the plate-holding cylinder 21, as the grooves 23 are disposed relative to the same plane. For this reason a plurality of grooves 65 are provided in the outer surface of the extension 61 of the tool holder 62. Since it is substantially universal practice to cut the grooves 23 in the cylinder 21 at an angle of 45 degrees to the axis of the cylinder, only one such groove 65 may be actually necessary.

The bed of the planer is run forward sufficiently to clear the uprights 41, and one end of a rack 26 is placed in the end of one of the grooves 23, and manually riveted or otherwise secured therein. In their initial form before they are mounted in the grooves 23, the side walls of the racks 26 are vertically disposed, and the racks are of such a width as to permit them to readily slide downwardly into the grooves 23. After they have been loosely positioned in the bottom of the grooves, downward and outward pressure on their upper surfaces adjacent their outer edges will force a certain amount of metal into the angular recesses 25 to firmly secure them in the bottom of the grooves.

One end of a rack 26 having been secured in the rear end of one of the grooves 23 by hand, such portion of the groove 23 is brought beneath the guide roller 77, and the latter is lowered into this groove. The rack 26 extends loosely in front of the guide roller 77 and is maintained in line with the groove 23 by the forwardly extending guide bars 79. The initial cross vertical adjustment of the riveting tool 48 down into the selected groove 23 is had by moving the tool holder 45. Any desired degree of downward pressure may be maintained on the tool holder 62, and consequently the guide roller 77, by adjusting the collar 54 to vary the tension in the coil spring 59.

The arrangement of these parts is such that the guide roller 77 is resiliently and not positively held against vertical movements. Since the cylindrical body portion 51 is rigidly held by the clamp 49, vertical movement of the riveting roller 74 is positively prevented by the rod 56 abutting against the tool carrier 69. This rod provides a

means of micrometric adjustment for the riveting roller 74.

The bed of the planer 31 is now moved rearwardly (to the right in Figure 1), which carries the cylinder 21 past the riveting tool 48. Since the guide roller 77 is positioned in the selected groove 23, the cylinder 21 will be rotated by the guide roller as it is moved rearwardly. To assist in this rotative movement of the cylinder 21, the tensioning means 36 may be employed as above described. As the cylinder 21 is moved past the riveting tool 48, the guide roller 77 insures proper positioning of the rack 26 in the bottom of the groove 23 since the teeth of the roller are formed to accurately mesh with those of the rack. For this reason, the guide roller 77 may also function as a final forming tool for the teeth 27 of the rack. If it is desired, a suitable shoe may be secured to the tool holder 62 in advance of the guide roller 77 to relieve the guide roller from the side pressure developed in rotating the cylinder 21.

The riveting roller 74 is positioned vertically so that its teeth 76 will dig into the upper side surfaces of the rack defined by the recesses 28. The shape of the teeth 76 is such that this will result in a sideward deflection of some of the metal into the inclined recesses 25 at the bottom of the groove 23. The particular shape of the riveting roller 74 will also insure against any damage being done to the teeth 27 of the rack in this riveting operation.

It is of course necessary in inserting the racks as above described, to remove the printing plate supporting cylinder from the press. After the cylinder has been mounted in the press, however, the racks 26 may be repaired by use of the mechanism shown in Figures 5 to 13 without removing the cylinder therefrom.

Referring more particularly to Figures 5, 6 and 7, a drilling jig 82 is shown which is substantially rectangular in shape, with the lower portion thereof adapted to fit slidably into a groove 23 in the plate supporting member 21. The jig 82 is provided with an upper marginal flange 83, which rests upon the top surface of the plate supporting member 21 when the jig is positioned in a groove 23. The bottom surface of the jig 82 is provided with a plurality of teeth 84, which are adapted to engage between the teeth 27 of the rack 26 in the bottom of the grooves 23. Adjacent each end, the lower portion of the jig 82 is provided with a recess 85, which communicates at its upper end with a vertical bore 86. A clamping bolt 87 is mounted in each of the bores 86, and is provided at its lower end with an elongated head portion 88 disposed within the recess 85. The upper end of each of the clamping bolts 87 is threaded for engagement by a nut 89, and is provided with an angular, axially disposed recess or bore 91 (Fig. 5). The center portion of the jig 82 is provided with a plurality of longitudinally spaced bores or apertures 92, the axes of which coincide with the longitudinal axis of the jig. Two additional bores or apertures 93 are provided adjacent one of the end apertures 92, which are spaced to either side thereof and have their center lines disposed on a cross line at the same angle as the teeth 84 and 27.

When it is desired to repair a particular portion of one of the racks 26, the drilling jig 82 is inserted into the groove 23 over that portion of the rack which is to be repaired. The teeth 84 of the jig insure its being properly positioned relative to the teeth 27 of the rack 26. A key

or tool (not shown) is inserted in the angular recesses 91 to turn the clamping bolts 87. A partial rotation of the clamping bolts 87 will turn the elongated head portions 88 thereof into engagement with the undercut recesses 24 in the groove 23. The nuts 89 are then tightened to bring the head portions 88 upwardly into firm locking contact with the top walls of the recesses 24 and force the teeth 84 downwardly into the spaces between the teeth 27 of the rack.

The apertures or bores 92 and 93 are then used as guides for a drill of any suitable construction. The drill will cut downwardly through the rack 26, with the groove 29 in the bottom portion thereof insuring that the rack is completely cut through without damaging the lower surface of the groove 23. It is preferred that a bottoming drill be employed, and a suitable stop collar may be set thereon to limit downward movement of the drill by contacting the upper surfaces of the jig 82. This operation having been performed, the jig 82 is removed from the groove and reversed end for end and replaced in contact with the same portion of the rack that it engaged in its first position. The drilling operation is then repeated.

The apertures 92 are so spaced that these two drilling operations will completely cut away the center portion of that part of the rack 26 which is being repaired. The hole that is cut through the rack as determined by the end aperture 92 farthest removed from the apertures 93 will have its center line on the same line as the holes determined by the guide apertures 93 in the reverse position of the jig 82. The end portions of that part of the rack 26 being cut out will thus be cut away as shown at 94 in Figure 8.

A trimming jig, indicated generally by reference numeral 95, is then employed to square off the jagged end portions 94, of that part of the rack 26 remaining in the groove 23. Referring more particularly to Figures 8 to 10, the trimming jig 95 is rectangular in shape and of such a size as to fit loosely within the groove 23. The jig 95 is provided with an upper marginal flange 96, which is adapted to rest upon the top surface of the plate supporting member 21 when the jig is positioned in the groove 23. The bottom surface of the jig 95 is provided with a plurality of teeth 97, which are adapted to engage between the teeth 27 of the rack 26 on one side or the other of that portion of the rack which has been cut away in the drilling operation.

The jig 95 is provided with a recess 98 in its lower portion which communicates with a vertical bore 99 having a clamping bolt 101 extended therethrough. The bolt 101 is provided with an elongated head portion 102 at its lower end, and is threaded adjacent its upper end for engagement with a locking nut 103. An angular recess or bore 104 extends downwardly into the upper end of the clamping bolt 101. The members 101, 102 and 103 are substantially identical, both in form and function, to the members 87, 88 and 89 of the drilling jig 82.

One of the lower corners of the trimming jig 95 is cut away at 105, (Figure 10), and a vertical bore extends through the jig adjacent the rear end of this cut-away portion. The lower end of the bore 106 is enlarged to provide an angular chamber within which is slidably positioned the lower rectangular head portion of a chisel or cutting member 107, which terminates at its lower end in a blade 108. The upper end of the chisel 107 is threaded and extends above the top

surface of the jig 95. A bolt 109 is screwed on the upper end of the chisel 107 to limit the downward movement thereof, and is held in set position by a locking nut 111.

The trimming jig 95 is positioned in the groove 23 in the same manner as the drilling jig 82. The teeth 97 insure proper longitudinal positioning of the jig, so that the blade 108 of the chisel 107 will be directly above the side surface of the last remaining tooth 27 of the rack 26 adjacent the cutaway portion thereof. Since the blade 108 of the chisel is disposed at the same angle as the teeth 97 and 27, a sharp blow imparted to the chisel will cleanly trim off the jagged edges 94 of the rack that are left by the drilling operation.

If it is desired, two chisels or cutters 107 may be mounted, one in either end, in the trimming jig 95, rather than the one herein disclosed.

Any loose pieces or chips that are left in the bottom of the groove 23 after the drilling and trimming operations have been performed, may be blown out of the groove or removed therefrom with a magnet.

A repair piece 112 (Figure 13), shaped to fit exactly into the blank space in the rack 26 resulting from the above drilling and trimming operations, is inserted into this space in the bottom of the groove 23, and riveted in place with a hand riveting tool, such as that disclosed in Figures 11 and 12 and indicated by reference numeral 113.

The tool 113 is substantially square in cross section, and is cut away at its bottom end to provide a transverse recess 114. Depending from the bottom of the tool on either side of the recess 114 are longitudinally disposed teeth 115. The teeth 115 have a vertical cross-sectional shape similar to the teeth 76 of the riveting roller 74 of Figures 1 to 4. The recess 114 is of substantially the same width as the tooth 27 of the rack, so that the tool 113 may be disposed in the slot 23 with the teeth 115 straddling the central portion of the repair piece 112. Downward pressure on the tool 113 will spread some of the metal of the marginal edges of the repair piece into the angular recesses 25 at the bottom of the groove to rivet the repair piece in place.

With the above described mechanism, the racks 26 or any desired portions thereof may be readily repaired without the necessity of removing the plate cylinder 21 from the press. The longitudinal groove 29 in the bottom surface of the rack 26 acts as a clearance for the drill in cutting through the rack. The same result could be obtained by cutting a recess in the bottom surface of the groove 23. The above described arrangement, however, is obviously much more desirable.

Should it be necessary to put in a much longer repair piece than that shown in Figure 13, it would perhaps be easier to cut off the ends of the piece in the manner above described, and then cut through it longitudinally with a saw or narrow milling cutter operating in a suitable fixture. Regardless of the method employed, the longitudinal cutting through of the rack 26 permits it to be readily pulled out from under the angular recesses 25 in the groove 23. These recesses 25 need not be very deeply cut into the sides of the groove, a few thousandths of an inch being sufficient to rigidly secure the rack in the bottom of the groove.

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. A printing plate mounting device, comprising a plate supporting member having a groove therein, and a rack secured in said groove, there being a longitudinal space provided of less width than the rack between the bottom surface of said rack and the associated wall of said groove to facilitate removal of the rack from the groove.

2. A printing plate mounting device, comprising a plate supporting member having a groove therein, and a rack so constructed and arranged as to be secured in said groove by means of at least some portions of its marginal edges being upset against the side walls of the groove, there being a longitudinal space provided of less width than the rack between the bottom surface of said rack and the associated wall of said groove to facilitate removal of the rack from the groove.

3. The method of inserting a rack in a groove in a printing plate supporting member, comprising introducing the rack into the groove from the open top of the groove, and rigidly securing the rack in the bottom of the groove by upsetting portions of the rack against the side walls of the groove.

4. The method of inserting a rack in a longitudinal groove in a printing plate supporting

member having recesses in the side walls adjacent the bottom of the groove, comprising introducing the rack into the groove from the open top thereof, and securing the rack in the bottom of the groove by displacing portions of the rack laterally into said recesses.

5. The method of repairing a rack mounted in a groove in a printing plate supporting member, comprising removing a selected portion only of said rack, and securing a similarly constructed piece of rack in said groove as a replacement for said removed portion by upsetting portions of said piece of rack against the side walls of the groove.

6. The method of repairing a rack mounted in a groove in a printing plate supporting member, comprising removing a selected portion only of said rack, trimming the ends of the rack remaining in the groove adjacent the removed portion, and securing a fitted piece of rack in said groove in place of said removed portion by upsetting portions of said piece of rack against the side walls of the groove.

7. The method of repairing a selected portion of a rack mounted in the bottom of a groove in a printing plate supporting member, comprising cutting through said selected portion along lines adjacent the ends thereof and a line extending longitudinally thereof, trimming the ends of the rack defined by said selected portion, and securing a fitted piece of rack in said groove in place of said selected portion.

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