Jan. 22, 1952 J. BURGESS 2,582,960

PRINTING PLATE FASTENING

Filed Oct. 2, 1945 2 SHEETS—SHEET 1

Fig:1.

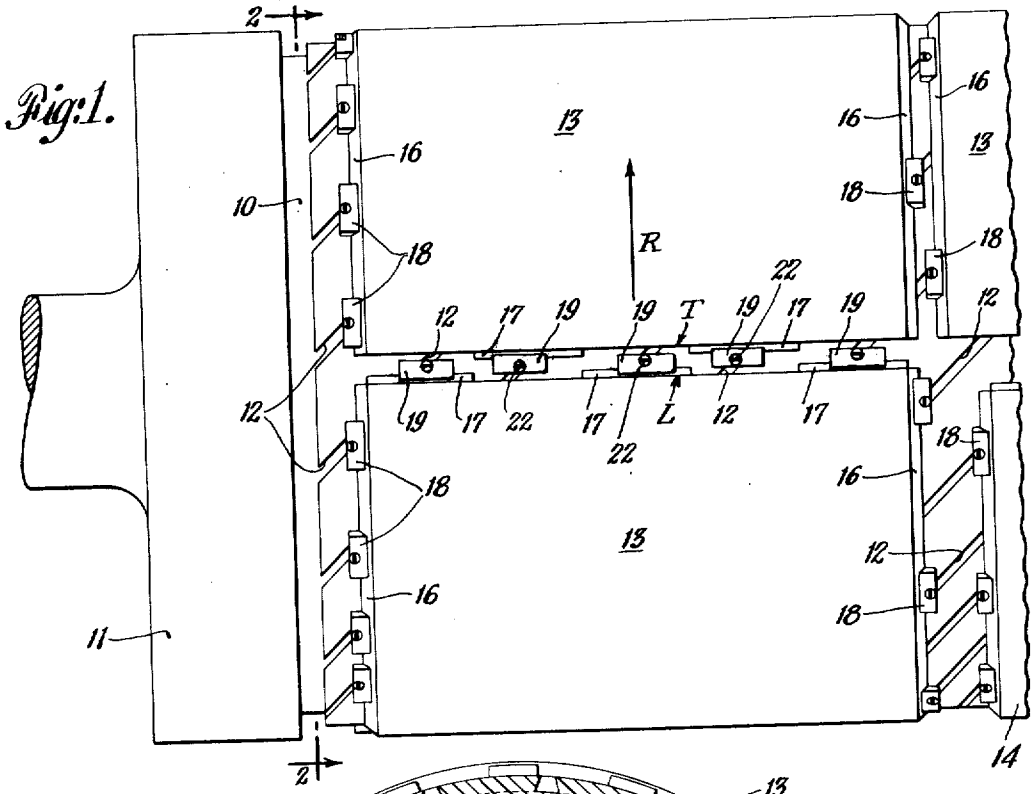

Fig:2.

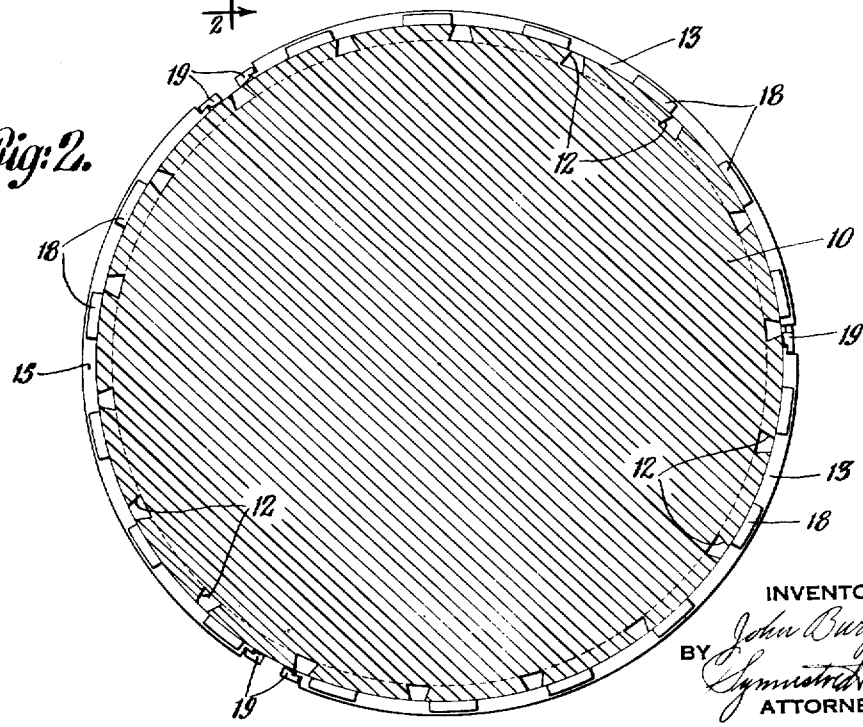

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Fig. 3.

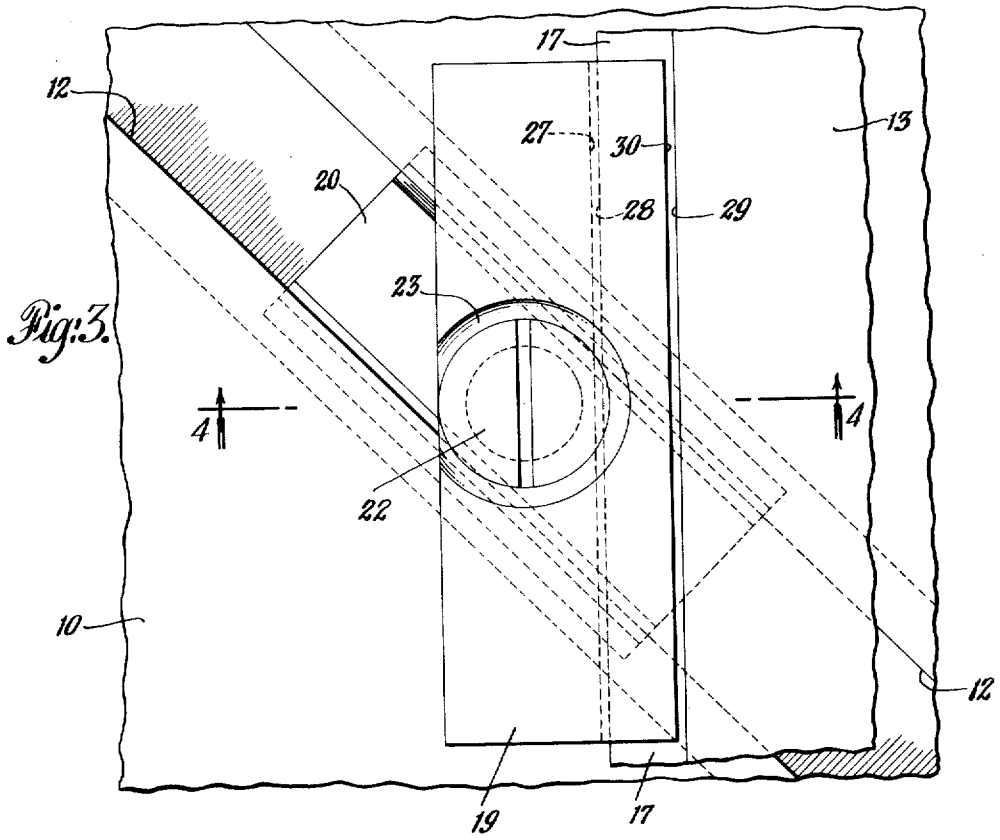
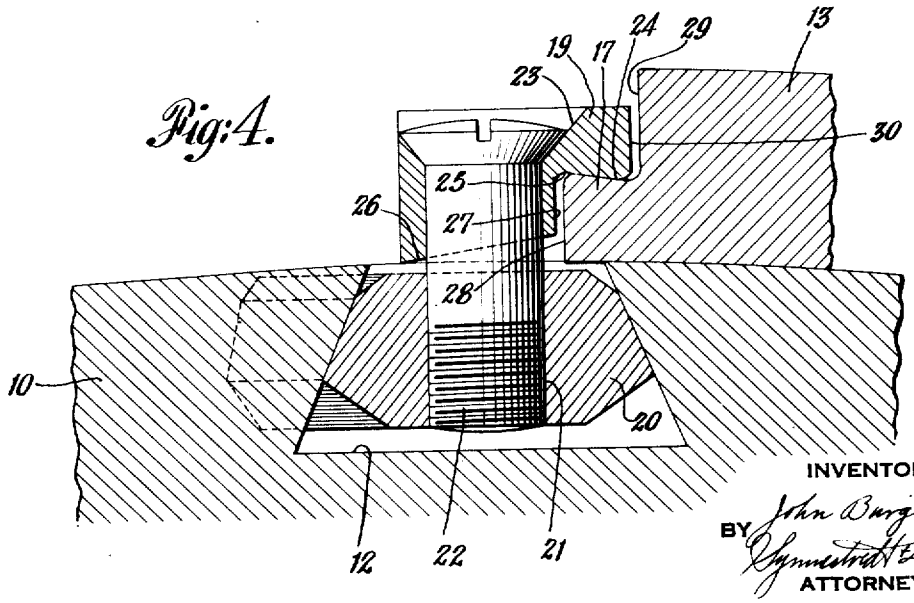


Fig. 4.



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Patented Jan. 22, 1952 2,582,960

UNITED STATES PATENT OFFICE

2,582,960

PRINTING PLATE FASTENING

John Burgess, Camden, N. J., assignor to The Curtis Publishing Company, Philadelphia, Pa., a corporation of Pennsylvania

Application October 2, 1945, Serial No. 619,850

11 Claims. (Cl. 101—378)

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This invention relates to the art of printing from plates. It is concerned with new arrangements and methods for "locking up" or mounting printing plates, and with improvements in the art of printing made possible by the employment or such mounting arrangements. Although many features of my invention are useful wherever printing plates are use, regardless of the type of press, the advantages of the invention are most fully realized in magazine, catalog and other printing on a rotary letterpress, especially where fine color work is required. For this reason, the invention is described primarily in connection with rotary letterpress printing.

Briefly described, the plate lock-up arrangement of my invention comprises a specially formed clamp or plate catch incorporating an adjustable hook-like member cooperating in a novel way with the plate and the suport therefor, and configured to engage a complementarily formed portion of a printing plate.

As applied to rotary magazine printing, the most important object or advantage attained by use of the arrangement of the invention is the resultant increase in printing speed made possible, without impairing accuracy of registry or incurring danger of plate breakage and consequent press and form damage, and loss of time. Plates locked up according to this invention may be quite safely run even at press speeds more than double those heretofore possible.

In the art of rotary printing, it has long been customary to mount curved printing plates upon a helically-grooved printing cylinder by means of plate catches. These catches are two-part clamps, held together by a bolt or stud. The helical grooves in the cylinder are undercut to receive and retain the lower part of the catch, and the catch is slid along one of the helical grooves until the upper part abuts against an edge of the printing plate.. With prior types of catches the plate-engaging surface of the clamp usually slants upwardly from the plate cylinder towards the upper surface of the plate, to match the sides of the plate which are customarily bevelled downwardly and outwardly from the printing surface. Since the base part of the clamp is interlocekd with and retained in the undercut groove in the cylinder, tightening the stud locks the two parts of the catch firmly in place.

A serious drawback in the above conventional form of plate mounting just described is that it cannot be relied upon to maintain accurate registry particularly over a long run and especially at high press speeds. At the higher speeds, centrifugal force tends to bow the plate outwardly away from the cylinder. The catches at the trailing edge of the plate resist creeping in that direction, but the plate pulls away from the catches at the leading edge, since they are only in abutting contact, and poor registry results. Quite commonly, the pressure at the trailing edge is so great that the catch bites into the plate margin, so that the plate is deformed and moves still further from the true registry position.

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When the leading edge of the plates comes under impression, the pressure of the impression cylinder tends to drive the plate still further away from the catches at the leading edge. As the impression line progresses toward the trailing edge of the plate, the bowed metal is forced back into contact with the plate cylinder, and this results in a "working" of the metal of the plate as it is alternately bowed outward by centrifugal force and forced inwards by the pressure at the printing zone. Crystallization will eventually result. If the first signs of crystallization are not promptly detected, the plate may break up and fly off the cylinder, with damaging results.

The present invention aims to overcome the above and other drawbacks resulting from the use of known plate-mounting arrangements. Indeed, the invention attains several important objects. Among those of primary importance the following may be specifically noted:

The invention provides an arrangement for locking up, that is, mounting printing plates upon the plate cylinder or other foundation support in such a way that completely accurate registry will be maintained during impression. To attain this objective, the printing plate is so mounted upon the cylinder that the leading edge of the plate is positively prevented from moving away from a predetermined line of registry in a direction opposite to the direction of movement of the support or cylinder as it approaches and passes through the impression zone.

Furthermore, the arrangement of the invention not only provides more positive maintenance of registry, but in addition the invention simplifies and facilitates securing accurate registry of the plates when they are initially applied to the plate cylinder.

The invention makes possible the maintenance of completely accurate registry even at printing speeds greatly in excess of those heretofore considered maximum.

The invention avoids or curtails plate breakage by reducing or eliminating "working" of the

plate metal under the forces to which it is subjected. This objective is attained by mounting the plate upon the cylinder or other support in such a way that it is advanced by tension applied at the leading edge, instead of being pushed by thrust applied at the trailing edge.

The device of this invention makes it possible to install "underlay" at any point beneath the plate where it might be necessary. This is in contrast to some proposals that have been made in the past for securing a plate in position from the underside of the plate. It is obviously impossible to underlay that portion of the plate which lies directly above a fastening of that type. Yet low spots in the printing surface are most likely to develop in precisely such a location.

In addition to these, and other advantages, it may be noted that the mounting arrangement of this invention is such that the physical operations of mounting the plate on the base are reduced in number, and simplified in character. Where my arrangement is used, plates can be mounted more rapidly and with much less risk of error than in the past.

How these, and other objects which will be apparent to those skilled in the art, may be attained is illustrated in the accompanying drawings, wherein a preferred embodiment of my invention is shown as applied to a rotary letterpress, and will be further manifest as this description proceeds.

In the drawings:

Fig. 1 is a somewhat diagrammatic view, in elevation, of a portion of a printing press plate cylinder having several plates mounted thereon in accordance with the present invention.

Fig. 2 is a transverse section on the line 2—2 of Fig. 1.

Fig. 3 is a detail view on a greatly enlarged scale illustrating in plan the plate hook of my invention and the associated parts of a plate cylinder and printing plate. The plate is partially broken away to show the relationship of other parts beneath it.

Fig. 4 is a section on the line 4—4 of Fig. 3. This section is taken in a plane perpendicular to the rotative axis of the plate cylinder.

Referring now more particularly to Figs. 1 and 2: a plate cylinder 10 is shown, which is provided with the conventional bearer ring 11, and with the conventional spiral slots or grooves 12. These slots are spaced apart possibly an inch or two, as experience may suggest. In order to simplify the showing of Fig. 1, these grooves have been illustrated as diagonal straight lines. Actually, they would have a pronounced spiral appearance when viewed in elevation. Furthermore, the number of slots illustrated has been somewhat reduced as compared to the number which would normally be employed. The slots are dovetail or undercut in cross section, as is clearly seen in Fig. 2.

A number of printing plates are shown mounted in position on the cylinder. Those marked with the reference numerals 13 are what are known as "bleed" plates. That is, they are intended to print a larger area than the trim size of the finished page. A couple of regular-sized plates are indicated at 14 of Fig. 1 and 15 of Fig. 2, respectively. These, of course, are considerably smaller than the bleed plates, since they are intended to leave a white margin on all sides of the printed and trimmed page. For purposes of illustration, the curved edges 16 of the printing plates

are shown as being bevelled in the conventional manner.

The direction of rotation of the cylinder is indicated by the arrow R. The trailing edge of one of the plates 13 is indicated by the reference letter T and the leading edge of the adjacent plate 13 is indicated by the letter L.

It will be seen that the leading and trailing edges illustrated are not bevelled, as are the curved edges 16, but are provided with lugs or tongues 17 configurated as shown to best advantage in Fig. 4. These lugs 17 will be described in greater detail hereafter.

Along the curved edges of the plates, a number of conventional plate catches 18 are illustrated. The leading and trailing edges of the plates, however, are held in position by the improved plate catches of the present invention, now to be described. Reference may be had to Figs. 3 and 4 in this connection.

It will be seen that the plate catch assembly consists of two parts. One of these is the catch or hook part 19, which is so shaped that it is, in effect, a hook. Midway of its length, this hook portion is provided with a countersunk bore 23. The other part of the catch assembly is the base member 20. This base member fits within the slot 12, and is so configured that it can easily be slid from point to point within the slot. It is provided with a central threaded opening 21. A bolt or stud 22 passes through the bore in the upper part of the catch and makes threaded engagement with the opening 21 in the lower part. The bore is countersunk as at 23, so as to make certain that the stud does not project so far above the level of the clamp as to make contact with the inking rolls or platen cylinder.

It will be seen that the plate 13 has been provided with a tongue or rabbet 17 projecting therefrom adjacent the cylinder 10, which tongue, instead of being bevelled outwardly and downwardly from the plate towards the surface of the cylinder 10, is bevelled in the opposite sense. In other words, the tongue of the printing plate 13 is of half-dovetail form in cross section, having an upper surface 24 which is inclined upwardly and outwardly. The plate catch 19 is provided with a lip having a complementarily inclined surface 25.

The lowermost face of the member 19 is preferably angled as at 26, on a plane which rises as it approaches the edge of the plate, so that the bottom edge of the catch which is farthest from the plate forms a heel which bridges the groove 12 and rests upon the surface of the plate cylinder, as appears in Figure 3. It will be seen that the hook member 19 is so proportioned that, when the heel 26 rests upon the surface of the cylinder, and the mating surfaces of the hook lip and the rabbet are in contact, a slight clearance exists between the upper vertical edge 29 of the plate 13 and the adjacent vertical surface 30 of the hook lip. A similar clearance is provided between the lower vertical edge 28 of the rabbet 17 and the lower vertical edge 27 of the hook member 19. This clearance is of importance for reasons fully explained hereafter.

As a safeguard against possible stress fracture, fillets are provided, merging the surfaces 24, 29 of the plate, and 25, 27 of the hook. The appropriate corner edges of the rabbet and of the hook lip are rounded slightly, to match these fillets.

The operation of the device is as follows: The printing plate is placed in position on the plate cylinder 10. The improved plate hooks of the

present invention are applied facing the leading and trailing edges of the plate. When the plate has been positioned to secure accurate registry, the studs are tightened one after another to secure the plate hooks 19 in position. Side catches of the type shown at 18 may then be applied as desired along the curved edges of the plate. Alternatively, all edges of the plate may be rabbetted in accordance with this invention, in which case plate hooks 19 are used on the curved edges as well as on the leading and trailing edges.

In applying the plate hooks 19, the base portion 20 may, for convenience, be slid along the groove 12 until the upper vertical surface 30 of the hook abuts against the upper vertical face 29 of the plate. The stud may then be tightened enough to bring the base member 20 into contact with the sloping surfaces of the groove 12. Then the whole hook assembly may be backed away from the plate 13, until the surfaces 24 and 25 are firmly in contact. In this position, there will be a noticeable degree of clearance between the vertical surfaces 29 and 30. The stud is drawn up tight when the parts are in this position.

By reason of the angularity of the surface 26 a heel or ridge is formed on the base of the hook member 19 opposite the rabbet and this causes a tendency for the clamp as a whole to rock towards the plate 13 on tightening of the stud 22. When this occurs, the hook tends to bite into the rabbet 17 and thus to engage it very firmly. Moreover, it follows from this and the angling of the surfaces 24 and 25 that, the harder the plate pulls, the tighter the hook binds. Any tendency for the surface 25 to "ride up" on the surface 24 is effectively resisted, since the thrust is related directly to the heel formed by angling the base surface 26.

This is in contrast to the conventional arrangement, in which the plate is provided with a simple bevel, and the plate catch is provided with a mating bevel. With a mounting of that type, the tightening of the catch applies a substantial edgewise thrust against the plate, and thus each catch actually tends to throw the plate out of registry; and if the plate tends to pull away from the catch, there is nothing to hold it. Play readily develops between the bevelled clamp and the bevelled edge, at least at the leading edge of the plate; and the metal of the plate will hammer against the catches periodically, as centrifugal force causes the plate to bulge and pressure at the impression line forces it back into place.

It will be seen that when the plate hook of my invention has been drawn up in the position shown in Fig. 4, the only play possible is in a direction which brings the clamp and the plate closer together. Movement in this direction is, of course, resisted by the friction of the mating surfaces 24, 25, which is determined by the degree of tightening of the stud 22 and also by the grip of the clamps at the opposite end of the plate. However, the fact that this small amount of movement is possible constitutes a valuable safety feature for the following reasons.

The clearance spaces referred to provide freedom for some tilting movement of the hook member 19 when the stud is tightened, without imposing any edgewise thrust against the plate.

So far as I am aware, no other device on the market provides clearance spaces of the type above mentioned ensuring that no edgewise thrusts are applied against the plate.

If the plate does fit the cylinder exactly when first installed, it will roll out when under impression, thus becoming a fit; the clearance between the plate catch and the edge of the plate allows the plate to roll out to fit the cylinder without causing the plate to bulge, thus protecting the plate against working, crystallizing and eventually breaking.

When the plate hooks of the present invention have been drawn up, it will be seen that the leading edge of the plate is held against the plate cylinder in such a way that movement of the plate rearwardly from the plate hook is quite impossible. The result of this is that the plate hooks at the leading edge draw the plate even through the printing zone under tension. That is, the plate is pulled through impression, instead of being pushed through the printing zone by thrust against the catches at the trailing edge. Moreover, this is accomplished by a securing means which engages the plate in advance of the leading edge of the printing surface of the plate, so that underlay may be installed below any portion of the printing area of the plate.

Throughout the remainder of the cycle of rotation, the chief problem is that of centrifugal force, which tends to bow the plate outwardly. Since the plate is firmly anchored peripherally of the cylinder not only at its trailing edge but also at its leading edge, and is not subjected to edgewise compression thrusts by the securing devices, the plate tends to hug the cylinder, and the bowing under the action of centrifugal force is reduced. Because of the arrangement of the invention, plates may be quite safely run even at press speeds more than double those heretofore employed.

Referring again to Figs. 1 and 2, it will be seen that the lips 17 formed on the bleed plates 13 have been cut away at intervals. This is an advantageous feature where plates are to be mounted close together. The cut-away sections on one plate edge are in staggered relation to the cut-away sections of the adjacent edge of the neighboring plate. The size of the lugs thus formed is so calculated as to allow plenty of room for shifting the clips 19 lengthwise of the plate edge. That is to say, the lugs formed on the leading edge of the lower plate 13 in Fig. 1 come opposite to cut-away sections on the trailing edge of the upper plate, and the hook 19 which holds the leading-edge lug can be slid right or left as need may be, in the cut-away section of the trailing edge facing it.

By cutting away spaced sections of the plate edge and providing lugs on the opposite edge of the adjacent plate, it is possible to use plate cylinders having a smaller circumference than would otherwise be required. Since the circumference of the cylinder determines the amount of paper used, this reduction in circumference effects a continuous saving of paper throughout the life of the press.

It is to be understood, of course, that the formation of staggered lugs on the plate edges may be omitted, where there is plenty of marginal space between the plates. Under such conditions, the lip 17 is formed simply as a continuous rabbet.

With my novel mounting arrangement it is important to apply an adequate number of hooks on the leading edge of the plate to ensure that the plate is held under traction. Fewer hooks at the trailing edge will suffice. This is in contrast to prior practice where it has been customary to apply the greater number of clips on the trailing edge instead of on the leading edge, since thrust

against the trailing edge was used to drive the plate.

When the advantages of the apparatus shown are considered, it becomes apparent that the invention not only comprehends improvements from the structural standpoint, but also from the operational standpoint. For instance, the invention makes it possible to print with magazine plates by pulling the plates through the impression zone while maintaining absolutely accurate registry. Moreover, plate breakage is prevented by so mounting a printing plate that "working" of the metal thereof during printing is reduced.

In addition, a novel method of actually securing the plates in position is made possible by the structure shown and described. It may be said that, when applying an ordinary bevelled edge plate, the catches, which are correspondingly bevelled, are moved into abutting contact with the plate edge. Then the catches are lightly drawn up proceeding from one catch to the next all around the circumference of the plate. Thereafter, each stud is given another turn, proceeding from stud to stud around the plate, and so on, until the plate is finally firmly held in position. This is necessary, because the angle of the plate-engaging face of the stud is such that it tends to thrust the plate away from the line of registry. As a matter of fact, after the conventional catches which secure a conventional plate in position have been tightened as much as possible, they are driven forcibly against the plate bevels, and this actually causes the plate to bow, thus lifting it off the plate cylinder. In contrast, with my invention, it is possible to secure the hooks without working around the plate a plurality of times. In fact, each of the plate hooks may be firmly and finally secured in position, one at a time. This is because the angle of the surfaces **24** and **25** is not so great as to move the plate away from its line of registry. It therefore becomes possible so to manipulate the plate hook while it is being adjusted and clamped into position that a considerable saving in time may be effected, while at the same time reducing the probability of error in registry.

As has been noted before, the advantages which can be obtained through the use of my invention are most fully realized when the invention is used in association with high speed rotary presses of the type employed in magazine printing. An important reason for this is that magazines are printed from relatively thin plates. These do not have sufficient inherent rigidity to withstand centrifugal force of the magnitude incident to high speed operations without excessive bulging, when such plates are mounted in accordance with prior practice. Moreover, especially where fine color work is required, extremely accurate registry is of the greatest importance, since, as is well understood in this art, a separate plate is prepared for each color to be printed, and it is therefore quite often necessary to have five different plates print in sequence over exactly the same surface. The arrangement of this invention not only greatly reduces bulging of the plates even at very high speeds, but also facilitates obtaining and maintaining accurate registry.

I claim:

1. An arrangement for mounting a curved printing plate on a printing cylinder having registration grooves, said arrangement comprising a tongue projecting from the plate in a direction circumferentially of the cylinder and having a portion with its under surface lying against the periphery of the cylinder, said portion having an upper surface inclined upwardly as it extends away from the plate, and a plate catch having a base member engaged in a registration groove, a hook part with a lip projecting therefrom over the tongue on the plate and having a lower surface inclined downwardly as it extends toward the plate and mating with the inclined surface of the tongue, and a fastening element associated with the base member and the hook part of the catch for drawing the lip of the hood part against the tongue of the plate to thereby clamp the plate against the cylinder.

2. A construction according to claim 1 in which the hook part of the catch is provided with a heel abutting the cylinder but is clear of the cylinder in a region intermediate the heel and the plate and in which the fastening element between the base member and the hook part is connected with the latter in said intermediate region.

3. A parti-cylindrical printing plate having a plurality of spaced fastening lugs projecting circumferentially from the leading and trailing edges thereof for cooperation with plate catches adapted to mount the plate on a printing cylinder, the number of said lugs projecting from the leading edge of the plate being greater than the number projecting from the trailing edge thereof, and the lugs at the leading and trailing edges being positioned in staggered relation to each other axially of the plate, whereby upon mounting a plurality of plates circumferentially of a printing cylinder with the leading edge of one plate adjacent the trailing edge of another, clearance is provided between the lugs on one plate to accommodate plate catches associated with the lugs on the other plate.

4. A printing plate as defined in claim 3, in which a greater number of lugs are provided on the leading edge than on the trailing edge and in which the leading edge lugs are shaped to interfit with plate hooks adapted to draw the plate through impression.

5. For a printing press having a plate cylinder with registration grooves formed therein, a printing plate curved to conform with the cylinder surface and formed with a projecting lip, which lip has a portion spaced from the plate which is thicker than an intermediate portion of the lip between said thicker portion and the plate and has an under surface lying against the periphery of the cylinder, and a plate catch adapted to be adjustably secured in a registration groove of the cylinder and having a body portion provided with a projecting lip overlying and engaging said intermediate or thinner portion of the plate lip, the body portion of the catch having a bottom surface with a seating edge adapted to engage the cylinder surface in a region in advance of the projecting lip of the plate and being clear of the cylinder surface between said seating edge and its projecting lip, and the catch further including a tightenable securing element engaging the body portion thereof intermediate its projecting lip and said seating edge and extending inwardly from the body portion to enter the registration groove in which the catch is secured.

6. A construction according to claim 5 in which the printing plate has one of said projecting lips at each of the leading and trailing edges of the plate, the construction further including one of said plate catches associated with each of said lips.

7. A construction according to claim 5 in which the interengaging surfaces of the plate and catch

lips are appreciably extended axially of the plate.

8. A construction according to claim 5 in which the interengaging surfaces of the plate and catch lips have appreciably extended interengaging surface areas.

9. For a printing press having a plate cylinder with registration grooves formed therein, a printing plate curved to conform with the cylinder surface and formed with a projecting lip, which lip has a portion spaced from the plate which is thicker than an intermediate portion of the lip between said thicker portion and the plate and has an under surface lying against the periphery of the cylinder, and a plate catch adapted to be adjustably secured in the registration groove of the cylinder and comprising a body a lower portion of which is adapted to seat upon the periphery of the cylinder and having a bore for receiving a securing stud, the catch further having a lip projecting from the body at one side of said bore overlying said intermediate or thinner portion of the plate lip, the lip of the catch having a lower surface for engaging the lip of the plate, which lower surface is inclined downwardly as it extends away from the bore.

10. For a printing press having a plate cylinder with registration grooves formed therein, a printing plate curved to conform with the cylinder surface, and plate catches mounted in the registration grooves at the leading and trailing edges and also at the side edges of the plate, the leading and trailing edges of the plate and the catches at the leading and trailing edges having projecting tongues interengaging in a plane inclined upwardly away from the plate, thereby

cooperating to maintain the plate under traction circumferentially of the cylinder during operation of the press, and the side edges of the plate and the catches at each side edge having abutting surfaces bearing against each other with a force tending to clamp the plate under compression between the opposite side edge catches.

11. A printing plate catch adapted to cooperate with a printing cylinder and a plate mounted thereon and having a marginal lug, said catch comprising a body having a bore for receiving a fastening stud, the catch further having a plate-engaging lip projecting from the body at one side of said bore, and the body of the catch having a supporting heel portion projecting downwardly at the side of the bore which is opposite to the side from which the lip extends, the lip having a lower lug-engaging surface inclined downwardly as it extends away from the bore.

JOHN BURGESS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
772,219	Cottrell	Oct. 11, 1904
960,005	Droitcour	May 31, 1910
2,092,267	Tarlton	Sept. 7, 1937
1,980,386	Davis	Nov. 13, 1934
2,176,595	Pannier	Oct. 17, 1939
2,236,230	Worthington	Mar. 25, 1941
2,320,762	Tollison	June 1, 1943

Certificate of Correction

Patent No. 2,582,960 January 22, 1952

JOHN BURGESS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 6, for "or such" read *of such*; line 8, for "use" read *used*; line 19, for "suport" read *support*; line 47, for "interlocekd" read *interlocked*; column 4, line 11, for "configurated" read *configured*; column 5, line 74, after "does" insert *not*; column 8, line 11, for "hood" read *hook*; column 10, line 31, list of references cited, for "Sept. 7, 1937" read *Sept. 7, 1927*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of April, A. D. 1952.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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