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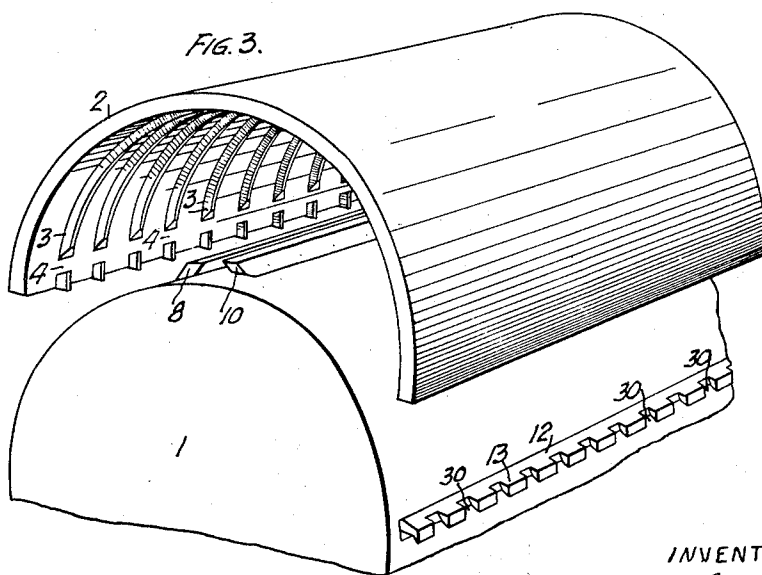
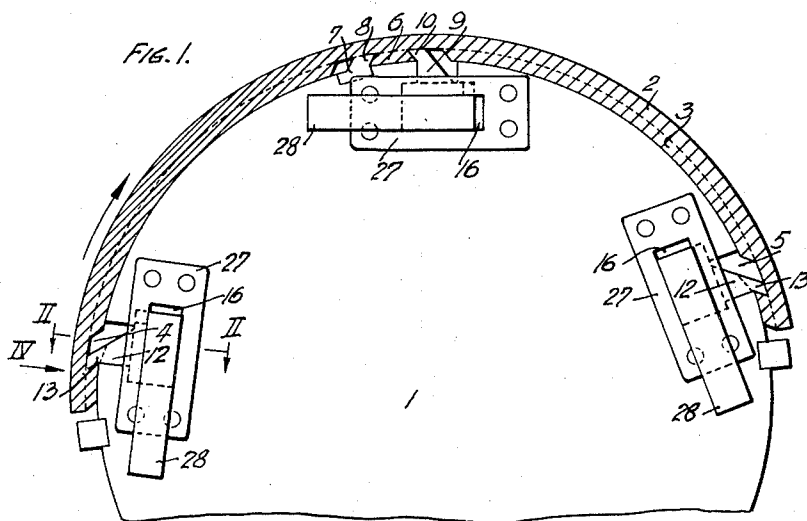
J. O. CRABTREE ET AL.

2,630,756

PRINTING PLATE FOR USE ON THE CYLINDERS OF ROTARY PRINTING
MACHINES AND IN CLAMPING MECHANISM THEREFOR

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2 SHEETS—SHEET 1



INVENTORS
John O. Crabtree
Charles W. Marshall
BY Albert J. Horton
ATTORNEY

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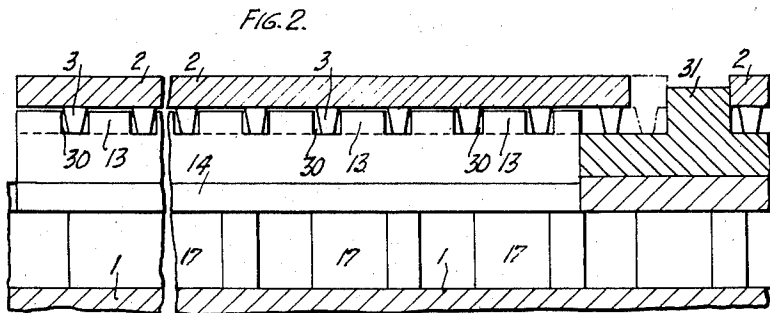
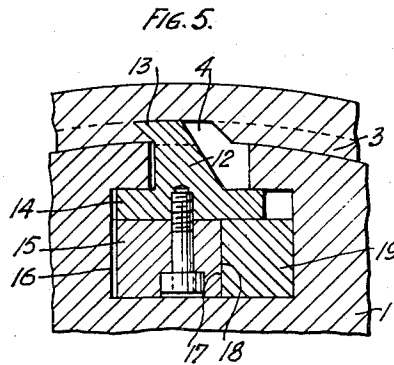
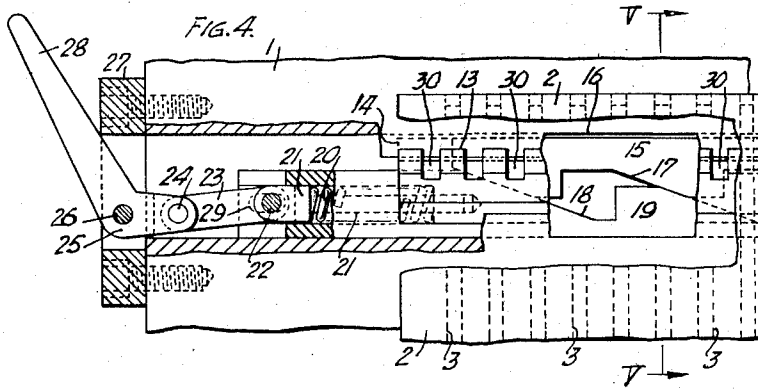
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2 SHEETS—SHEET 2



INVENTORS

John O. Crabtree
Charles G. Marshall
BY *Alfred Koston*
ATTORNEY

UNITED STATES PATENT OFFICE

2,630,756

PRINTING PLATE FOR USE ON THE CYLINDERS OF ROTARY PRINTING MACHINES AND IN CLAMPING MECHANISM THEREFOR

John Oldfield Crabtree and Charles William Marshall, London, England, assignors to R. Hoe & Co. Inc., New York, N. Y., a corporation of New York

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11 Claims. (Cl. 101—378)

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This invention relates to clamping mechanism for use in holding stereotype printing plates in position on the cylinders of rotary printing machines.

The invention is concerned with the holding of a plate to the cylinder by applying circumferential tension to the plate at its leading and trailing edges. Various proposals have been made for this purpose but in modern high speed machines the centrifugal force which acts on the plate becomes so great that it is necessary to increase the circumferential tension to the point at which there is danger that the stereotype metal will tear with consequent serious results, it being noted that the line of action of centrifugal tension is sensibly at right angles to the line of action of the centrifugal force.

The main object of this invention is to provide a clamping mechanism which while being of the circumferential tension kind will avoid the necessity for increasing the value of the tension to a dangerous value while yet ensuring that the plate will be held securely to the cylinder against centrifugal action.

Now according to the present invention a printing cylinder is provided not only with plate clamps to apply circumferential tension to the leading and trailing edges of a plate, but also with an intermediate clamp which provides an anchorage to hold the plate between its ends from lifting radially under centrifugal action and which also provides an abutment from which the clamps for the ends of the plate circumferentially tension the plate each way round the cylinder, i. e. in the one direction from its intermediate portion towards the leading end and in the other direction from its intermediate portion towards its trailing end.

The provision of the intermediate clamps which is in the nature of a plate grip since it takes hold of the plate to secure it against movement both circumferentially and radially, enables the circumferential tension to be reduced to a safe value.

The clamps to apply circumferential tension to the plate would be arranged in the form of hooks which engage under-cut surfaces on the printing plate so that these clamps are enabled not only to obtain a satisfactory purchase on the plate for the purpose of straining the plate from the intermediate clamp but also to hold the parts of the plate with which they engage from lifting under centrifugal action.

The under-cut surfaces are preferably formed by cutting away circumferential ribs provided on the under-surface of stereotype plates.

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The invention is illustrated in the accompanying drawings in which Figure 1 is an end elevation of a printing cylinder having a printing plate secured to it, Figure 2 is a longitudinal sectional elevation on the line II—II, Figure 1, showing only part of the total length of a printing cylinder, Figure 3 is a perspective view showing part of a printing cylinder and a printing plate prepared for use with the clamping mechanism, Figure 4 is a local elevation looking in the direction of the arrow IV, Figure 1, the figure being partly in section with parts broken away, and Figure 5 a section on the line V—V, Figure 4.

Referring firstly to Figures 1 and 3, 1 indicates a printing cylinder and 2 a stereotype printing plate fitted thereto, the plate having at its under surface (i. e. its concave surface) a series of circumferential ribs 3. These ribs are cut away to form recesses 4 and 5 near the longitudinal edges of the plate and to leave at the longitudinal centre of the plate a series of projections 6, the walls of the recesses 4 and 5 and of the projections being under-cut or sloped.

The cylinder 1 is fitted with clamping mechanism comprising intermediate clamps to engage or grip the projection 6 and clamps (or hooks) to engage in the recesses 4 and 5 to tension the plate circumferentially about the cylinder from the gripped projection 6.

The intermediate clamp comprises a fixed bar 7 having an upstanding hook-shaped part 8 to engage one undercut wall of the projection 6, a movable bar 9 also having an upstanding hook-shaped part 10 to engage the other undercut wall of the projection 6. The fixed bar 8 is disposed towards the trailing end of the plate 1 (it being assumed that the cylinder 1 will rotate in the direction of the arrow in Figure 1) while the movable bar 9 is disposed towards the leading end, and this movable bar is arranged to be operated to move in a direction towards the trailing end of the plate and hence towards the fixed bar 7 and so, conjointly with the fixed bar, to embrace and grip the dovetail projection 6. This results in anchoring the plate to the cylinder 1 against both circumferential and radial movement.

Each of the end clamps is similar and each comprises a bar 12 having hook-shaped projections 13 to engage the undercut walls of abutments formed by the recesses 4 and 5 at the leading and trailing edge respectively. Each bar is movable in the generally circumferential sense of the cylinder towards and away from the intermediate clamp.

Assuming that the intermediate clamp has

been operated to take hold of the projection 6 at the centre of the plate 3, the end clamp bars 12 at the leading and trailing edges of the plate are operated to strain or tension the plate away (in each direction about the cylinder) from the intermediate clamp which provides a fixed reaction point to the tensional strain.

It will be clear that the intermediate clamps 8, 10 by holding the projection 6, holds the plate at its centre against bulging outwardly under centrifugal pressure, the holding action thus being applied to the plate at the zone where it is most effective. The pressure which has to be applied to the plate by the hooks 13 can thus be well within the strength of the metal of the plate even at the high operating speeds of modern printing machines.

The various operating bars are arranged for actuation from the ends of the cylinder 1 and the actuating mechanism would include a spring or springs which would operate to urge the clamps to be spring held against their respective surfaces on the plate.

In the arrangement shown in the drawing and especially in Figures 2, 4 and 5, the two clamping bars 12 and the clamping bar 9 are similar as regards their operating mechanism and in Figures 2, 4 and 5 this is indicated by the combined references 12 (9) and 13 (10).

Each of the bars is flanged at 14 and is secured to a plate 15 which together with the flanges 14 are slidable in longitudinal recesses 16 in the cylinder 1, the direction of sliding movement being tangential of the cylinder. One edge of the plate 15 is formed with a series of wedge surfaces 17 along its length. Cooperating with these surfaces are other wedge surfaces 18 on an operating bar 19 which is slidable longitudinally in the recess 16. Hence by moving the bar 19 forwards or backwards, the clamping bars 9 and 12 are caused to move backwards or forwards tangentially of the cylinder so as either to thrust the hooks 10 or 13 against the abutment surfaces on the plate or to retract them from those surfaces.

The wedges would be arranged at such an angle as to be irreversible so that the operating bars cannot be reversed by reaction from the plate 2.

In order that the clamping bars 12 shall be spring pressed so as automatically to take-up any increase in the arcuate length of the plate and also in the case of the bars 9 and 12 to accommodate for differences in various plate, the operating bars 19 are bored at one end to receive a coil spring 20 which acts and reacts between the bar 19 and a plunger rod 21 which is pivotally connected at 22 to a link 23. The link is pivoted at 24 to an operating bell-crank 25 pivoted at 26 in a bracket 27 secured to the end of the cylinder 1, the bell-crank having an operating arm 28. When the bell-crank lever 25 is rocked, the corresponding bar 19 is moved backwards or forwards. When, in moving forwards, the wedges 18 thrust the hooks against the abutments on the plate 1 so that the hooks meet with resistance, the continued movement of the bell-crank 25 causes the spring 20 to be compressed and to urge the hooks forward by their spring pressure. The arrangement of the pivoted centres 22, 24 and 26 is such that the final movement of the bell-crank 25 carries the centre 24 past the straight line joining the centres 22 and 26, i. e. it carries the bell-crank to an over-centre position so that the spring 20

now reacts to hold the bell-crank 28 locked in its clamping position and at the same time to urge the hooks forwardly against the plate.

The pivotal connection 22 between the link 23 and the bar 19 is effected through a slot 29 in the bar 19. The slot enables the bar 19 to have freedom to be urged forward by the spring 20 without restraint by the operating bell-crank and (when the bell-crank is reversed to release the bar 19) the pin travels to the end of the slot and then positively moves the bar.

By reason of the irreversibility of the bar 9 of the intermediate clamp, a reaction is provided against which the action of the spring 20 of the clamp for the leading end of the plate can exert circumferential tension in a direction towards the leading end of the plate.

For the purpose of facilitating the fitting of a plate to the mechanism of this invention especially when the plate has as shown a substantial arc of a circle of say about 180°, the plate and at least one and preferably as shown both of the end clamping bars 12 are constructed in the following manner.

The clamping bars 12 instead of being formed with a continuous hook surface 13 are formed with spaced hook portions which leave gaps 30. The gaps have a pitch corresponding to the pitch of the ribs 3 of the plate 2. With this arrangement, the plate 1 can be presented face-on to the cylinder with the gaps 30 in register with the ribs 3 as shown in Figure 2. The plate is then slid longitudinally up to a margin ring 31 so as to bring the hook portions 13 left by the gaps 30 into longitudinal register as shown in Figure 4 with the ribs 3 or more precisely with the abutments formed by the recesses in the ribs. It is not necessary to form the clamp bar 9 in this way for the projections 6 on the plate can pass straight in between the hooks 8 and 10 when the hook 10 is retracted.

We claim:

1. In combination a printing cylinder, a curved stereotype plate, an intermediate undercut projection at the concave surface of the plate and extending axially thereof, an intermediate gripping device on the cylinder, the said device comprising two components, means to move one of the components relatively to the other, to grip the projection between them, undercut abutments respectively adjacent the leading and trailing edges of the plate, additional clamping components to cooperate respectively with the abutments, and means to move the additional components respectively in opposite directions away from the intermediate gripping device whereby to tension the plate from its edges in opposite directions away from the intermediate gripping device.

2. In combination a printing cylinder, a curved stereotype plate, an intermediate undercut projection at the concave surface of the plate and extending axially thereof, an intermediate gripping device on the cylinder, the said device comprising two components, means in the cylinder to move one of the components to grip the projection between them, undercut abutments respectively adjacent the leading and trailing edges of the plate, additional clamping components to cooperate respectively with the abutments, and means to move the additional components respectively in opposite directions away from the intermediate gripping device whereby to tension the plate from its edges in opposite directions away from the intermediate gripping device, the

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moving means for the intermediate gripping device and for each of the additional clamping components including a resilient device to urge the gripping device and the clamping components resiliently into engagement with the projection and the abutments.

3. In combination a printing cylinder, a curved stereotype plate, an intermediate undercut projection at the concave surface of the plate and extending axially thereof, an intermediate gripping device on the cylinder, the said device comprising two components, means to move one of the components relatively to the other, to grip the projection between them, the said means comprising an operating component in irreversible operating connection with the device and a spring interposed effectively between the operating component and the gripping device, undercut abutments respectively adjacent the leading and trailing edges of the plate, additional clamping components to cooperate respectively with the abutments, and means to move the additional components respectively in opposite directions away from the intermediate gripping device whereby to tension the plate from its edges in opposite directions away from the intermediate gripping device, the means for each additional component comprising an operating component in irreversible operating connection with its clamping component and a spring effectively interposed between the operating component and its clamping component.

4. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges undercut abutments parallel therewith, a printing cylinder having an intermediate gripping device to grip the intermediate projection on the plate, and having angularly spaced about the cylinder at each side of the gripping device clamping components to engage respectively the undercut abutments, means to actuate the intermediate gripping device and other means to move the clamping components respectively away from the intermediate gripping device.

5. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges undercut abutments parallel therewith, a printing cylinder having an intermediate gripping device to grip the intermediate projection on the plate, the said device comprising a component fixed to the cylinder and a second component movable towards and away from it, and having angularly spaced about the cylinder at each side of the gripping device clamping components to engage respectively the undercut abutments, means to actuate the intermediate gripping device and other means to move the clamping components respectively away from the intermediate gripping device.

6. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges undercut abutments parallel therewith, a printing cylinder having a pair of members comprising an intermediate gripping device to grip the intermediate projection on the plate and having angularly spaced about the cylinder at each side of the gripping device, clamping components to engage respectively the undercut abutments, means to actuate one member of the intermediate gripping device to move it tangentially relative to the

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cylinder to grip the projection and other means to similarly move the clamping components respectively away from the intermediate gripping device, the said actuating means and the said other means each comprising an operating member, a wedge device, and spring means to transmit operation from the operating member to the wedge device.

7. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges undercut abutments parallel therewith, a printing cylinder having an intermediate gripping device to grip the intermediate projection on the plate, the said device comprising a component fixed to the cylinder and a second component movable towards and away from it, and having angularly spaced about the cylinder at each side of the gripping device clamping components to engage respectively the undercut abutments, means to actuate the movable component of the intermediate gripping device and other means to move the clamping components respectively away from the intermediate gripping device, the said actuating means and the said other means each comprising an operating member, a wedge device, and spring means to transmit operation from the operating member to the wedge device.

8. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges, undercut abutments parallel therewith, a printing cylinder having a pair of members comprising an intermediate gripping device to grip the intermediate projection on the plate and having angularly spaced about the cylinder at each side of the gripping device clamping components to engage respectively the undercut abutments, means to actuate one member of the intermediate gripping device to move it tangentially relative to the cylinder, and other means to move the clamping components respectively away from the intermediate gripping device, the said actuating means and the said other means each comprising an operating member, an irreversible wedge device and spring means to transmit operation from the operating member to the wedge device.

9. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges undercut abutments parallel therewith, a printing cylinder having an intermediate gripping device to grip the intermediate projection on the plate, the said device comprising a component fixed to the cylinder and a second component movable tangentially thereof towards and away from the fixed component, and having angularly spaced about the cylinder at each side of the gripping device clamping components movable tangentially of the cylinder to engage respectively the undercut abutments, means to actuate the movable component of the intermediate gripping device and other means to move the clamping components respectively away from the intermediate gripping device, the said actuating means and the said other means each comprising an operating member, an irreversible wedge device associated respectively with the gripping device and the clamping devices and spring means to transmit operation from the operating member to the irreversible device.

10. In combination a printing cylinder, a

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curved stereotype plate, an intermediate axially extending undercut projection at the concave surface of the plate, an intermediate gripping device on the cylinder, the said device comprising two components, means to move one of the components relatively to the other, and tangentially of the cylinder to grip the projection between them, undercut abutments respectively adjacent and parallel to the leading and trailing edges of the plate one at least of the abutments being constituted by narrow longitudinally spaced elements, additional clamping components projecting a fixed distance outside the cylinder to cooperate respectively with the abutments, one at least of the additional clamping components having narrow longitudinally spaced elements to receive between them the abutment elements, and means to move the additional components respectively in opposite directions away from the intermediate gripping device whereby to tension the plate from its edges in opposite directions away from the intermediate gripping device.

11. For use with a curved stereotype plate having at its undersurface an intermediate axially extending undercut projection and in the region of its leading and trailing edges, narrow undercut abutments parallel therewith and formed by longitudinally spaced elements, a printing cylinder having an intermediate gripping device to grip the intermediate projection on the plate and having angularly spaced about the cylinder at each side of the gripping device,

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clamping components to engage respectively the undercut abutments, the said clamping components having narrow clamping elements projecting a fixed distance outside of the cylinder and which are spaced apart to receive between them the elements of the abutments of the plate so that the plate can be moved into position laterally and then moved longitudinally, means to actuate the intermediate gripping device and other means to move the clamping components respectively away from the intermediate gripping device.

JOHN OLDFIELD CRABTREE.
CHARLES WILLIAM MARSHALL.

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