United States Patent

Muselik

[15] **3,685,445**

[45] **Aug. 22, 1972**

[54] **CLAMPING APPARATUS FOR OFFSET CYLINDERS**

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[30] **Foreign Application Priority Data**

June 6, 1969 Czechoslovakia.....4005/69

[52] **U.S. Cl.**.....**101/415.1,** 101/378

[51] **Int. Cl.**.....**B41f 1/30,** B41f 27/12

[58] **Field of Search**.....101/415.1

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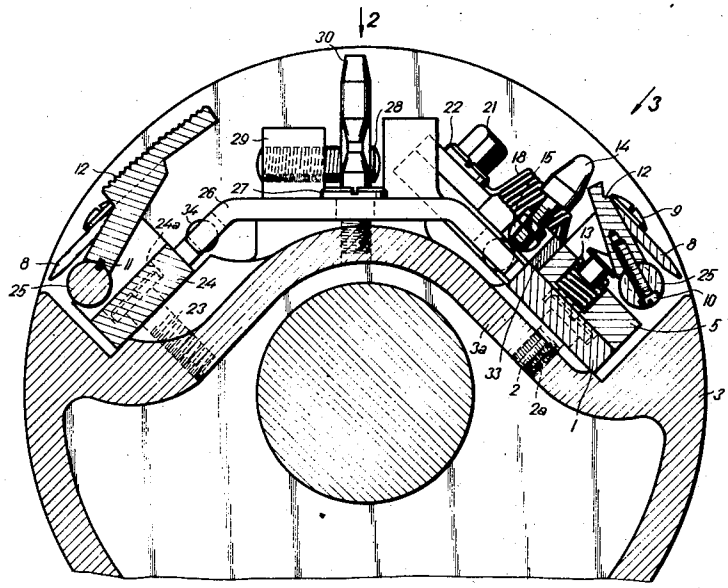
[57] **ABSTRACT**

An offset printing cylinder form is provided with a clamping apparatus comprising a pair of supporting members spaced apart and parallel to the axis of the cylinder adjacent the periphery thereof. Each of the supporting members mounts a clamp bar spaced therefrom, between which are mounted bearing means in which eccentrically rotatable shaft rods are located. A manual lever is provided for rotating the shaft rods into and out of engagement with the clamping bar. Latch means for holding the shafts thus engaged are also provided.

5 Claims, 8 Drawing Figures



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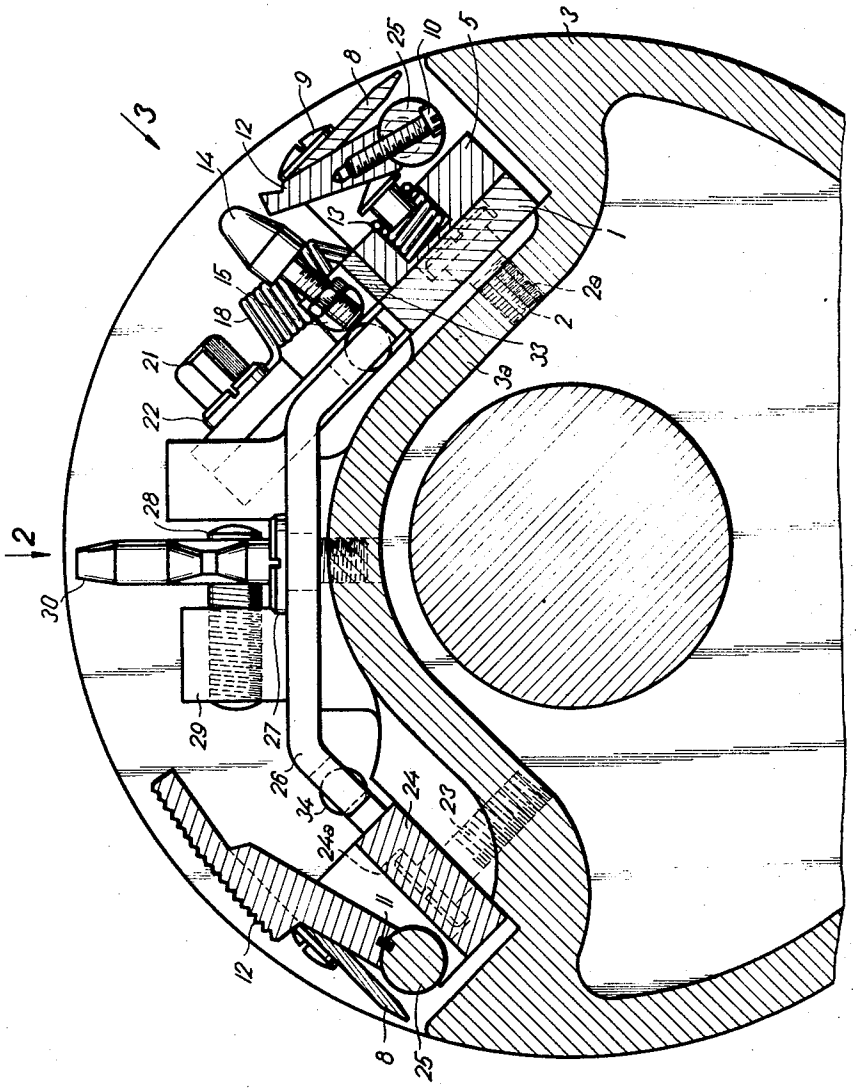

Fig. 1.

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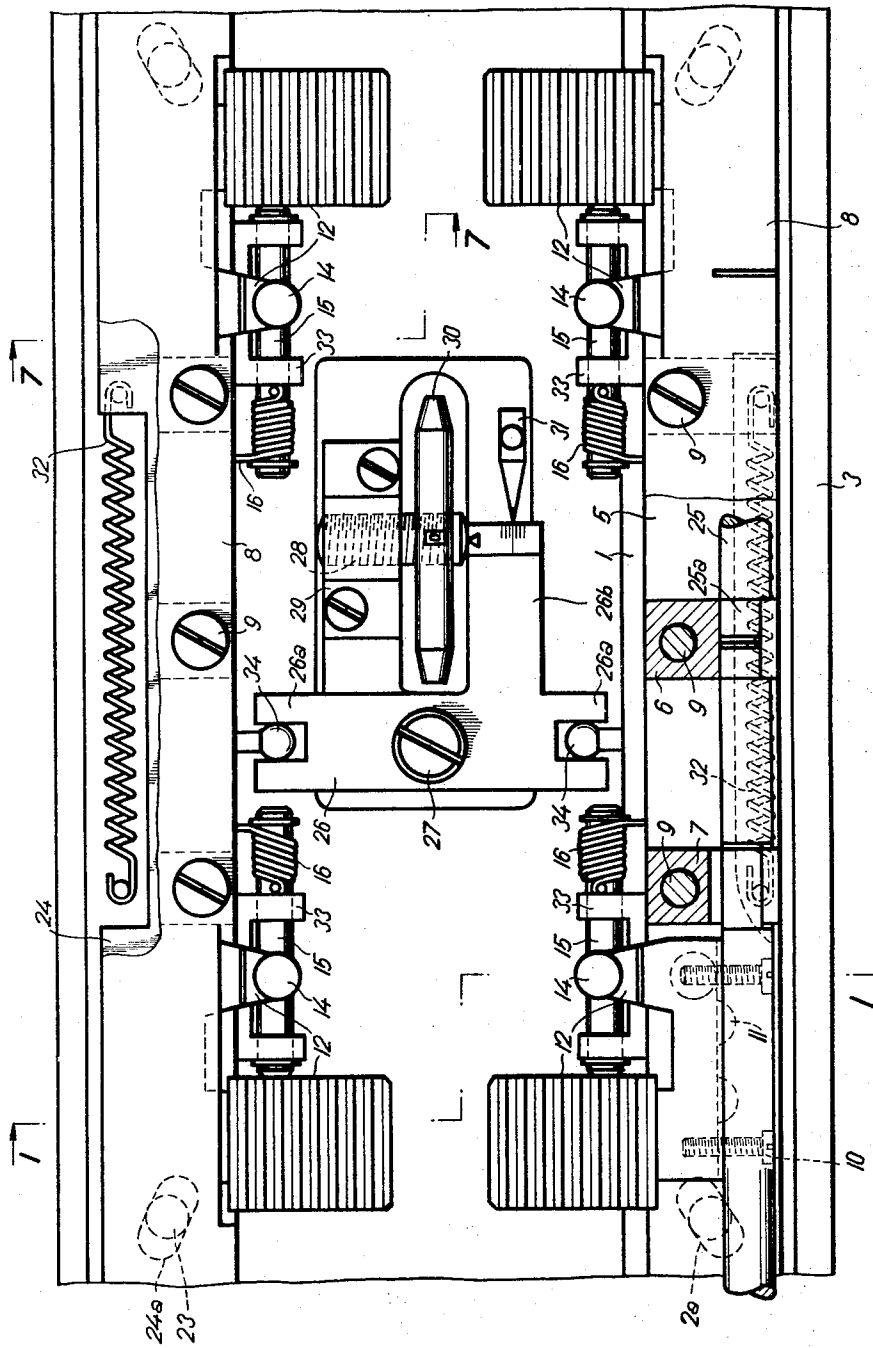

Fig. 2.

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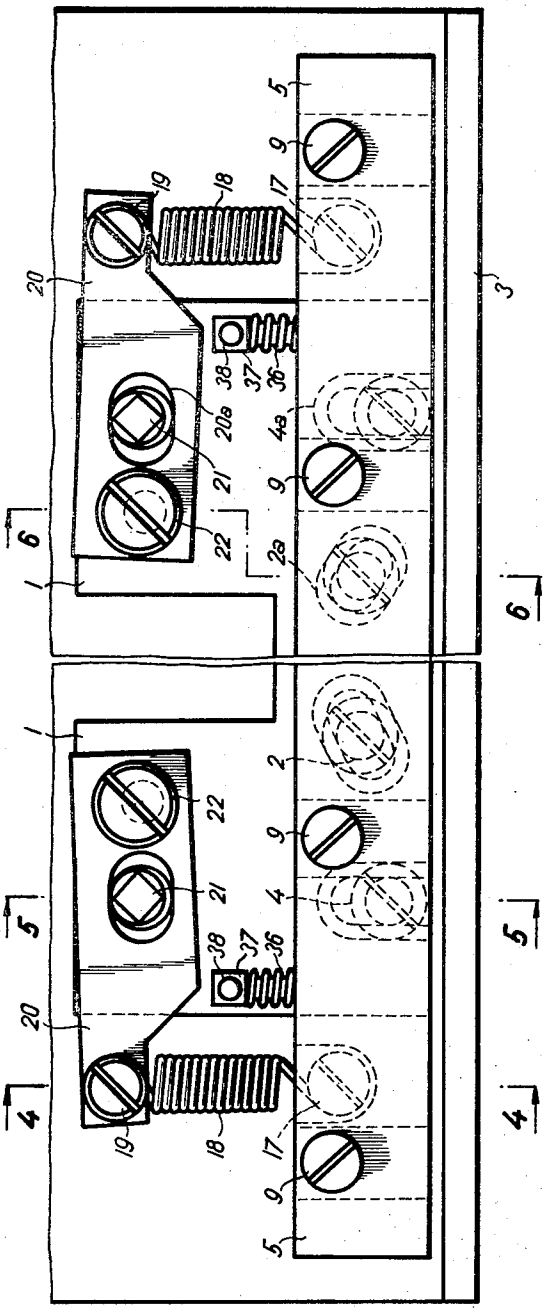

Fig. 3.

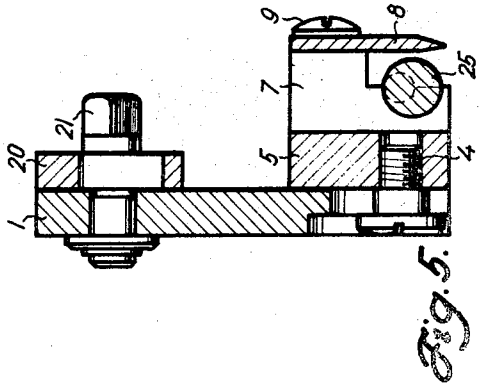

Fig. 5.

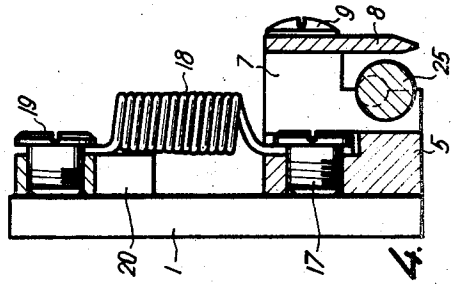

Fig. 4.

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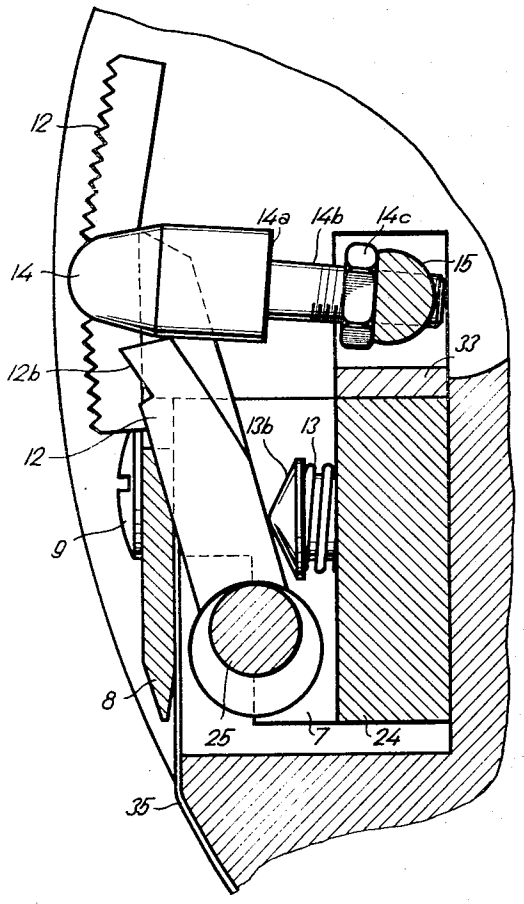

Fig. 7.

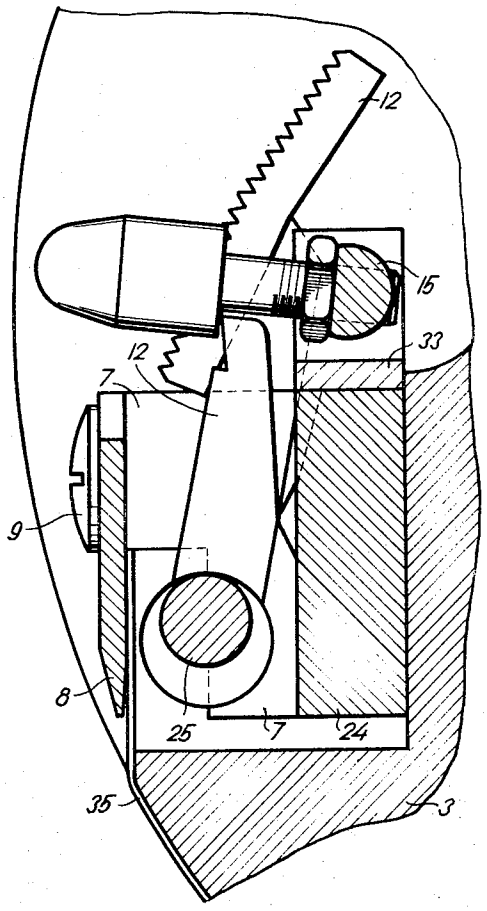

Fig. 8.

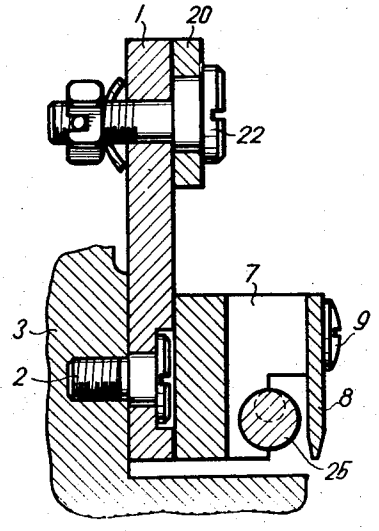

Fig. 6.

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CLAMPING APPARATUS FOR OFFSET CYLINDERS

BACKGROUND OF INVENTION

The present invention relates to offset printing machines of the single or multicolor variety and in particular to a clamping apparatus for securing the flexible printing plate or mat on the cylindrical offset drum.

It will be appreciated that in order to obtain the best possible results in an offset printing machine it is necessary to place the flexible printing plate or mat on the cylinder form so that it is in flat and tensioned position whereby the mat can be properly adjusted with respect to the paper sheet.

Conventional devices generally employ a pair of clamping bars between which the ends of the mat are screwed together. The disadvantage of such a device is the relatively long time required to effect the clamping operation and the extreme difficulty in manipulation of the screws and printing mat. In another device the clamping bars are provided with slots which are mounted on movable locating pins. The pins are moved by drive and lever mechanisms or other gearing devices to effect the clamping and adjustment of the bars. This device is also extremely time consuming and difficult to manipulate and further difficulty arises in that accurate adjustment or registration of the printing mat is difficult because of the interaction of the slots and steering gear mechanism which results in considerable dead travel space.

It is the object of the present invention to provide an offset printing cylinder with clamping means which overcome the difficulties of the prior devices.

In particular, it is an object of the present invention to provide a clamping means for an offset printing cylinder which is easy to manipulate, reduces the time required to clamp the printing mat, provides accurate tensioning for the mat as well as accurate adjustment and registration of the mat with the printed sheet.

SUMMARY OF PRESENT INVENTION

According to the present invention an offset printing cylinder form is provided with a clamping apparatus comprising a pair of supporting members spaced apart and parallel to the axis of the cylinder adjacent the periphery thereof. Each of the supporting members mounts a clamp bar spaced therefrom, between which are mounted bearing means in which eccentrically rotatable shaft rods are located. A manual lever is provided for rotating the shaft rods into and out of engagement with the clamping bar. Latch means for holding the shafts thus engaged are also provided.

In the preferred form the supporting bars are mounted so as to be shiftable in the direction parallel to the axis of the cylinder to thereby effect registration of the printing mat, while one of the supporting bars mounts a tensioning bar movable transverse to the axis of the cylinder to effect the proper tensioning and stretching of the mat, across the surface of the cylinder.

Full details of the present invention as well as an illustration of the objects and advantages thereof are set forth in the following description in which reference is made to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a sectional view to an offset printing cylinder in a plane transverse to the axis of the cylinder, as taken along line 1—1 of FIG. 2;

FIG. 2 illustrates a plan view of the central section of the offset cylinder seen in FIG. 1 taken in the direction of the arrow 2;

FIG. 3 is a view similar to FIG. 2 taken in the direction of the arrow 3 of FIG. 1;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 3;

FIG. 7 is a fragmentary sectional view taken along line F—F of FIG. 2 showing the clamping mechanism in open position; and

FIG. 8 is a view similar to FIG. 7 showing the clamping mechanism closed.

DESCRIPTION OF INVENTION

The present invention is directed to a control mechanism for use in an offset printing cylinder depicted in the drawings by the numeral 3. The cylinder 3 which is adapted to carry the flexible printing plate or mat (numeral 35 in FIGS. 7 and 8) about a substantial portion of its outer circumference. The flexible printing mat is stretched taut across the surface of the cylinder by being held at its ends in a clamping mechanism which is located in an open portion of the cylinder comprising a circular cross sector of about one third of the cylinder and extending along the entire length of the cylinder. The open portion of the cylinder is defined by a web portion 3*a*.

The control mechanism of the present invention is formed with a pair of elongated supporting bars 1 and 24 running the length of the cylinder in spaced parallel relationship to each other. The supporting bar 1 runs along the right side of the open sector as seen in FIG. 1 and is fastened to the central webbing 3*a* of the cylinder 3 by a plurality of screws 2. The screws 2 extend through slots 2*a* arranged obliquely to the axis of the cylinder. The slots 2*a* are counter-sunk and are somewhat oversized to permit sliding movement of the supporting bar 1 with respect to the retaining screw 2. Secured to the supporting bar 1 by a plurality of screws 4 is a tensioning bar 5. The screws 4 are set through a retaining slot 4*a* having its axis transverse to the axis of the cylinder. The slots 4*a* are also counter-sunk and slightly oversized permitting movement of the tensioning bar 5 transversely to the axis of the axis of the cylinder. Mounted on the tensioning 5 are a plurality of bearing means comprising a closed bearing 6 alternating between open bearings 7 in a repetitive pattern. In general application a series of three closed bearings 6 alternating with a series of four bearings 7 may be suitable. Mounted on the tops of each of the bearings and extending the length of the cylinder 3 is a clamping bar 8 secured to the tension bar through a screw 9.

The oppositely located supporting bar 24 is mounted in a similar way as the supporting bar 1 to the web 3*a* of the cylinder 3. The supporting bar 24 is provided with a series of slots 24*a* through which screws 23 are fastened to the web 3*a*. The slots 24*a* are slightly oversized to permit the supporting bar 24 to shift in a parallel manner to the supporting bar 1. The slots 24*a* are also

arranged obliquely to the axis of the cylinder, however, these slots are oppositely directed as seen in FIG. 2 to the slots 2*a* holding the supporting bar 1. Mounted on the supporting bar 24 are a plurality of closed bearings 6 and open bearings 7 on which is mounted a clamp bar 8 in similar manner to the bearings 6 and 7. A clamp bar 8 is mounted on the tensioning bar 5.

It will be observed that the structure of the left hand side of the cylinder, as seen in FIG. 1 is similar to the structure of the right hand side except that the right hand side contains the tensioning bar 5 mounted upon the supporting bar 1. Briefly, it should be appreciated that the supporting bars permit adjustment in the direction parallel to the axis of the cylinder while the movable tensioning bar permits stretching and tensioning of the printing mat over the surface of the cylinder 3. The bearings 6 and 7 and the clamping bar 8 comprise a portion of the entire clamping mechanism for holding the ends of the flexible printing mat. The clamping mechanisms are symmetrical and similar for both sides of the apparatus and will be further described in this manner.

Mounted in each of the bearings 6 and 7 on both supporting bars 1 and 24, are a plurality of shaft rods 25, each of which has a round bearing surface 25*a* eccentric to its outer surface. The shaft rods 25 are rotatable so that their outer surfaces move eccentrically to the bearing and are adapted to engage with the under surface of the clamping bar 8 as seen in FIGS. 4–8. The shafts are arranged so that their ends abut axially within the closed bearings 6 thus being retained therein while merely extending through the open bearings 7. In this manner the shaft rods 25 may be easily and simply assembled.

Affixed to each shaft rod 25 by means of screws 10 and mating keyways and keys 11 is a control lever 12 having a laterally extending knurled finger tab 12*a* on its outside surface and a latch shoulder 12*b* midway along its overall length. A helical spring 13 is secured about a movable button 13*b* which abuts against the back surface of the lever 12 to normally urge it in an outward position, maintaining the shafts 25 in a rearward or open position as seen in FIG. 7. The latching shoulder 12*b* of each of the control levers 12 bears against a corresponding shoulder 14*b* formed on an arresting pivot 14 comprising a barrel-like cylinder. The arresting pivot 14 has a shaft 14*b* which is adjustably screwed and fastened by a nut 14*c* to a half-round or bevelled shaft 15 rotatably mounted in a fixed circular bearing secured to the tension bar 5 or to the shift bar 24 as seen in FIG. 2. A helical torsion spring is wound about the shaft 15 to bias the shaft and consequently the arresting pivot 14 normally against the control lever 12. This biasing urges the shoulders 12*b* and 14*a* of the respective level and arresting pivots to to maintain engagement when the lever 12 is depressed. As is seen in FIG. 8 when the lever 12 is depressed the shoulders 12*a* and 14*a* latchingly engage moving eccentric shaft 25 toward the clamping bar 8 so as to clamp the end of a printing plate or mat 35 firmly therebetween.

The tensioning bar 5 mounted on the right hand supporting bar 1 is provided with means for adjustably urging or loading its movement in a chordal direction inwardly of the cylinder. Such mechanism is provided at either end of the tensioning bar 5 and comprises a spring 18 secured at the one end by a screw 17 to the tensioning bar 5 and at the other end by a screw 19 to a movable plate 20. The plate 20 is provided with a slot 20*a* within its center which straddles an eccentrically movable shaft 21 and is pivotally mounted at its other end about an eccentrically rotatable pivot shaft 22.

Both the shaft 21 and the pivot pin 22 are manually rotatable, the eccentric shaft 21 thus being adapted to vary the angular position of the plate 20 with the tensioning bar 5 while the pivot pin 22 being adapted to vary the parallel distance between the plate 20 and the tensioning bar 5. The control plate 20 can thus vary the degree of tension on the spring 18 and consequently the degree of tension urged by the tensioning bar 5 on the printing plate or mat. Clearance or play between the tension control plate 20 and the tensioning bar 5 is prevented by arranging a compression spring 36 about a holder 37 which is fixed by a fastener 38 to the supporting bar 1 as seen in FIG. 3. The compression spring 36 abuts against the side edge of the tensioning bar 5 so as to urge the tensioning bar against the action of the spring 18.

A movable tri-armed bridge member generally depicted by the numeral 26 is mounted to the interior cross-web 3*a* of the cylinder about a pivot pin 27. The bridge member comprises a pair transversely extending opposed arms 26*a* each having a terminal recess engaging about a spherical bolt 34 mounted outwardly from the respective supporting bar 1 or the supporting bar 24 midway along their axial length. The third arm 26*b*, of the bridge member, extends axially to the right as seen in FIG. 2 and bears against the head of a transversely arranged regulating screw 28. The regulating screw 28 is set within the bore of a nut 29 fastened to the web 3*a* and is provided with a thumb screw 30 by which it can be manually moved. The third bridge arm 26*b* is also provided with a calibrated scale indicating the degree of movement. Opposed to the scale is a pointer 31 which is secured to the web 3*a*.

By moving the adjustable regulating screw 28 the bridge member 26 is caused to pivot about the pin 27 causing the arms 26*a* to rotate thereabout, as a result of which both the supporting bar 1 and the supporting bar 24 are made to move in opposite directions axially of the cylinder. Since the supporting bars 1 and 24 are both set in their movement by the screws 2 and 23 in the oblique slots 2*a* and 24*a* respectively, the bars tend to move both axially and outwardly against the edges of the cylinder simultaneously. Thus enabling the proper registration of the printing plate mat carried by the clamping mechanism on the surface of the cylinder 3. A tension spring 32 is attached between the cylinder 3*a* and each of the supporting bar 1 and supporting bar 24 respectively to urge the shifting of the bars 1 and 24 in opposite directions to each other and against the pivoting of the bridge member 26 to normally maintain the third arm 26*b* in contact with the head of the regulating screw 28.

The described mechanism operates as follows: the flexible printing mat 35 is placed over the cylinder and its ends inserted between the shaft rods 25 and the clamping plate 8. The control levers 12 are then depressed so that the eccentric shaft rods 25 are rotated outwardly into clamping position against the clamping plate 8 securing holding the printing mat

therebetween as seen in FIG. 8. The locking latch 12*b* engages beneath the annular shoulder 14*a* of the arresting pivot 14 and is maintained there by the outward action of the spring means 13. The flexible mat 35 may be released by simply moving the pivot 14 disengaging the cooperating latches 12*b* and 14*a* causing the spring 13 to push the level outwardly returning the eccentric shaft rods 25 to the rest position as shown in FIG. 7.

Stretching or tensioning of the printing mat 35 on the surface of the cylinder 3 is carried out by the general movement of the tensioning bar 5 under the continuous action of the springs 18. The tension on the springs 18 can be controlled by the control plate 20 merely by turning the eccentric shaft 21, in any direction 180°. The tension may be varied to its maximum by causing the plate 20 to pivot about the pivot pin 22 to increase the angle between the plate 20 and the tensioning bar 5 thus pulling the spring 18 taut. If a further adjustment is necessary of the plate 20, the pivot pin 22 may be also rotated thus shifting the entire plate 20 laterally toward or away from the tensioning bar 5. The eccentric mounting of the pivot 22 itself allows the plate to be laterally adjusted toward and away from the edge of the cylinder so that the tensioning bar can be moved to accommodate larger or smaller sized printing plates 35.

Registration of the printing plate on the cylinder 3 can be adjusted by merely adjusting the regulating screw 28 by turning the knob 30. The regulating screw 28 is then caused to bear against the arm 26*b* of the bridge member 26 shifting the supporting bar 1 and the supporting bar 24 axially of the cylinder as previously described. The springs 32 maintain the bars 1 and 24 constantly urged to have the bridge member bear against the regulating screw 28 preventing any vibration or backlash.

From the foregoing it will be quite apparent that the mechanism described is not only simple and effective but has numerous advantages over the prior art devices described in the introduction hereto. For example the clamping of a flexible printing mat is carried out manually only by pressing down on the control levers 12 opening each of the clamping mechanism comprising the eccentric shaft rods 25 and the clamping bar 8. No special tools are required to effect the clamping and screws or other fastening means are not used. The printing mat may be released from clamping position easily and effectively by simply shifting the arresting pivots 14 which releases the levers 12 and thus returns the clamping shaft 25 to its open position. The operator may then remove the printing mat without really coming into contact with any part of the cylinder having ink or other dirty substances.

A further advantage lies in the fact that the tensioning of the flexible printing plate is obtained by the manipulation of a control plate 20 merely by turning one of the two eccentric pivot shafts 21 or 22. The same control plate is also used to vary the overall distance so as to accommodate printing mats of different sizes. In any event the tensioning bar 5 is under the constant tensioning urging of the springs 18 maintaining the printing mat always in stretched and proper condition.

Further the registration of the printing mat is effected simply and efficiently through the combination of shiftable bars and bridge member 26 which effects the simultaneous meovement of both ends of the printing mat at the same time. Thus eliminating any dead travel in the mechanism etc.

It will, of course, be appreciated the various changes and modifications may be made in the present invention. Description made of the present invention is by way of illustration only and is not to be held as limiting in any manner.

What is claimed:

1. Clamping apparatus for securing a flexible printing mat on a surface of a cylinder comprising a pair of spaced elongated supporting members mounted on said cylinder to be shiftably movable in a direction parallel to the axis of said cylinder, a tensioning bar mounted on one of said supporting members to be movable transversely to the axis of the cylinder, said tensioning bar and said one elongated supporting member each mounting an associated clamp bar spaced therefrom, bearing means mounted between the respective support member and tensioning bar and said clamping bar, a shaft eccentrically rotatable in said bearing means to move into and out of engagement with said clamping bar and latch means comprising a first member extending from each of said shafts and a cooperating second member located on the associated supporting member and tensioning bar for selectively holding said shaft thus engaged, to secure the end of the printing mat therebetween, means interconnecting each of said support bars for simultaneous shifting each said support members in the direction parallel to the axis to register the secured printing mat longitudinally on said cylinder and means for moving said tension bar to stretch said printing mat across the circumferential surface of said cylinder.

2. Clamping apparatus for securing a flexible printing mat on a surface of a cylinder comprising a pair of spaced elongated supporting members mounted on said cylinder to be shiftably movable in a direction parallel to the axis of said cylinder, a tensioning bar mounted on one of said supporting members to be movable transversely to the axis of the cylinder, said tensioning bar and said one elongated supporting member each mounting an associated clamp bar spaced therefrom, bearing means mounted between the respective support member and tensioning bar and said clamping bar, a shaft eccentrically rotatable in said bearing means to move into and out of engagement with said clamping bar and latch means comprising a first member extending from each of said shafts and a cooperating second member located on the associated supporting member and tensioning bar for selectively holding said shaft thus engaged, said latch means comprising a manually operable lever and a pivoting arresting lever each having engaging shoulder means, means for resiliently biasing at least one of said levers toward the other to cause said shoulders to cooperatingly engage and latch against each other, said operative lever simultaneously moving said eccentric shaft into engagement with said clamping bar whereby on a cooperative engagement of said shoulders said clamping is effected, to secure the end of the printing mat therebetween, means interconnecting each of said support bars for simultaneous shifting each said support members in the direction parallel to the axis to register the secured printing mat longitudinally on said cylinder and means for moving

said tension bar to stretch said printing mat across the circumferential surface of said cylinder.

3. The apparatus according to claim 2, wherein each of said elongated bars are provided with a tension spring adapted to bias said elongated bars axially of said cylinder, said tension spring being secured to said cylinder to urge said elongated bars in opposite directions, each of said elongated bars being provided with a spherical head bolt, a bridge member interposed between said elongated bars, said bridge member comprising a three-armed lever a pair of said arms being transversely opposed to each other and engaging respectively one of said head bolts, the third arm of said bridge member extending axially of the cylinder into abutting engagement with a regulating screw member adapted to pivot said bridge means, spring means normally urging said third arm into contact with said regulating screw member whereby movement of said adjustment screw pivots said bridge member and causes axial movement of said elongated bars.

4. The apparatus according to claim 3, wherein said regulating screw is provided with means for manually adjusting the same and said bridge members have calibrated indicia indicating the position thereof.

5. The apparatus according to claim 4, wherein the means for moving the tensioning bars comprises a movable plate a first eccentric pin pivoting said plate at one end and a tensioning spring connecting the other end of said plate to said tensioning bar, a second eccentric pin secured midway of said plate, said eccentric pins being adapted to vary the angular and lateral positions between said plate and said tension bar to thereby vary the force on said tension spring.

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