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Merbold et al.

[11] **3,817,173**

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[54] **DIAGONAL REGISTER ADJUSTMENT OF PLATE CYLINDER AND APPLICATOR ROLLS IN A ROTARY PRINTING MACHINE**

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[52] **U.S. Cl.** **101/218,** 101/247, 101/352

[51] **Int. Cl.** **B41f 13/34,** B41f 7/02

[58] **Field of Search** 101/248, 286, 375, 218, 101/138, 349, 350, 351, 352, 217, 182, 185, 184, 247

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Primary Examiner—J. Reed Fisher
Assistant Examiner—William Pieprz

[57] **ABSTRACT**

An apparatus for diagonal register adjustment of a plate cylinder and applicator rollers for printing presses, and in particular rotary cylinder offset printing presses, which comprises a plate cylinder including bearings. Each of the bearings of the plate cylinder having an additional rotatably movable eccentric bushing and the angular adjustment of the bushing setting the plate cylinder oblique to an offset cylinder. Means are provided for positively controlling applicator rollers not tangent to the adjustment arc. The eccentric bushing for the diagonal adjustment of the plate cylinder has a substantially axial groove, a pull- or push rod has a collar, and the latter is guided in the axial groove. A ring member has at least two arms, arranged loosely on the eccentric bushing between a wall and a safety ring fastened to the eccentric bushing. Angle pieces have threaded bores and the arms at their ends into the angle pieces. Movable spindles are provided for the fine adjustment of bearings of the applicator rollers.

5 Claims, 4 Drawing Figures

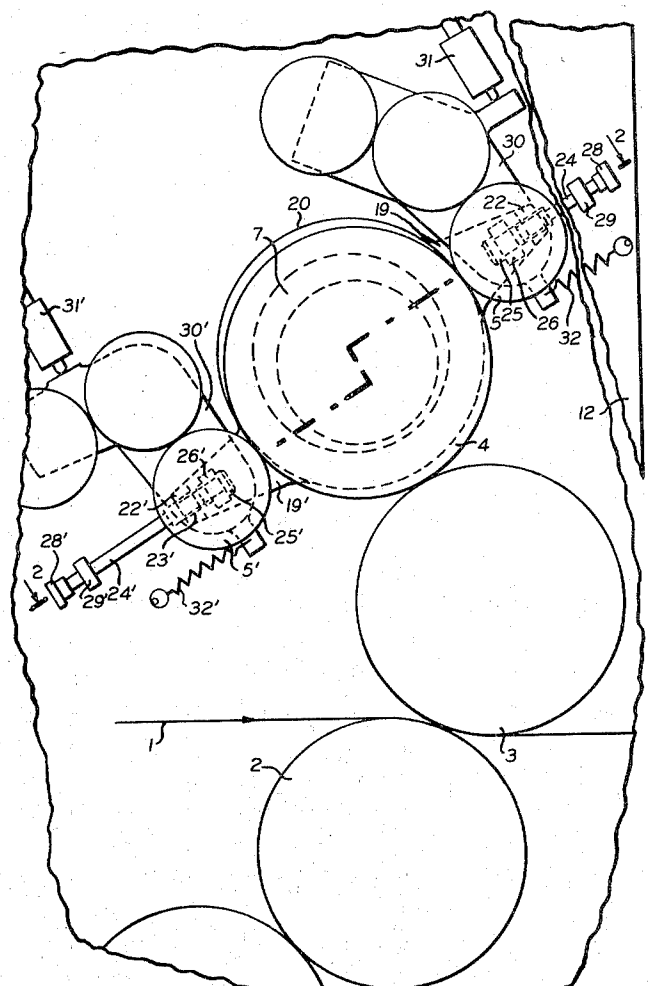


FIG. 1.

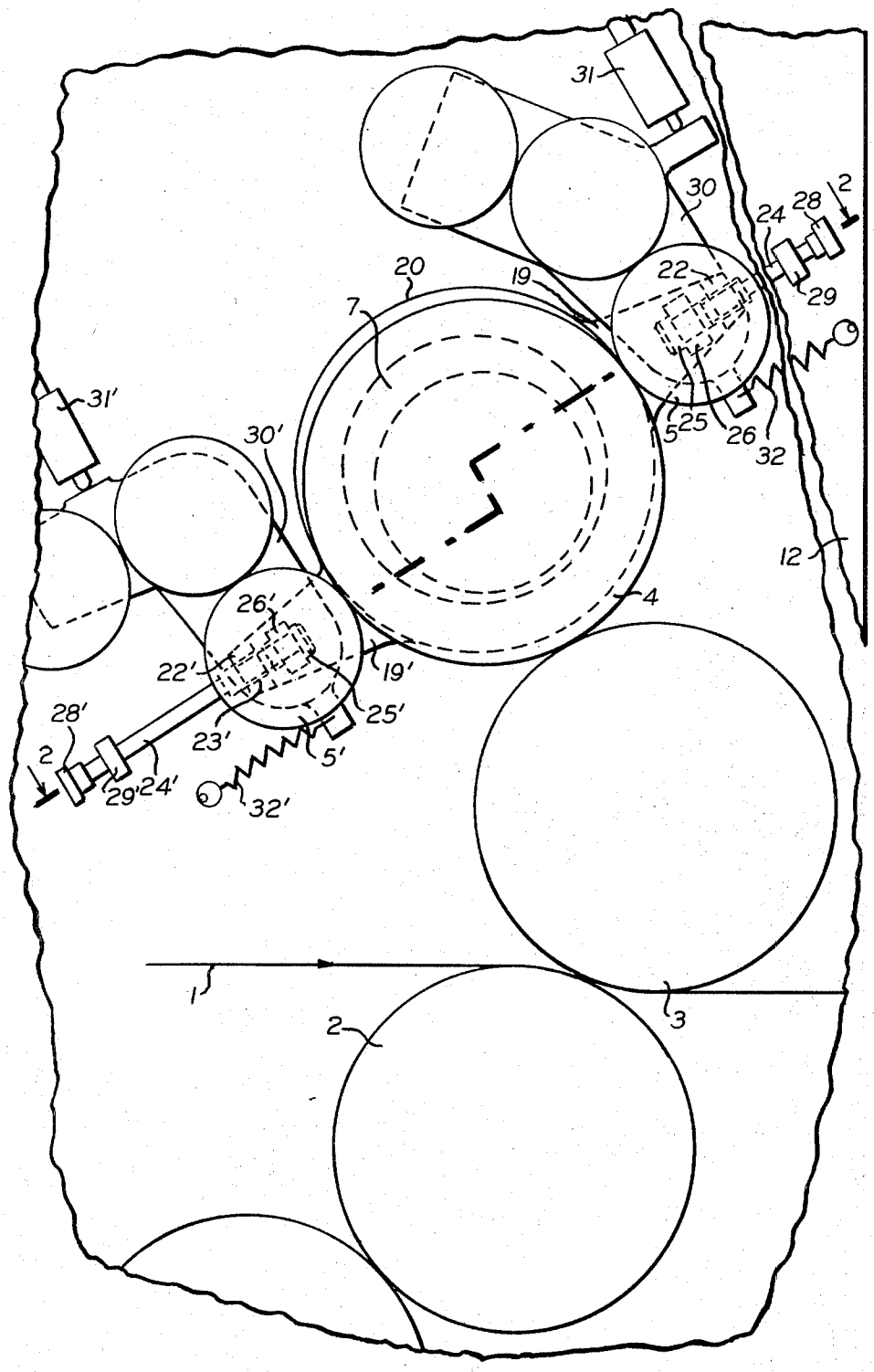

31
30
2
24
28
29
20
19
22
7
31'
30'
25
26
32
12
4
26'
22'
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28'
23'
5'
2
29'
24'
32'
1
3
2

FIG. 2.

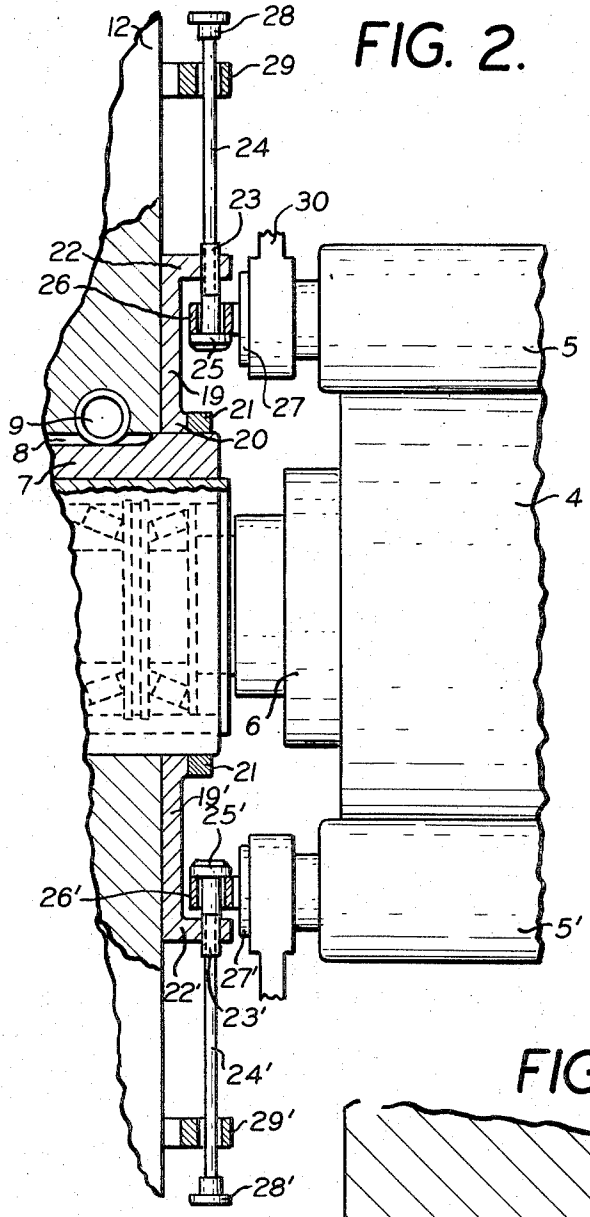

12
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28'

FIG. 5.

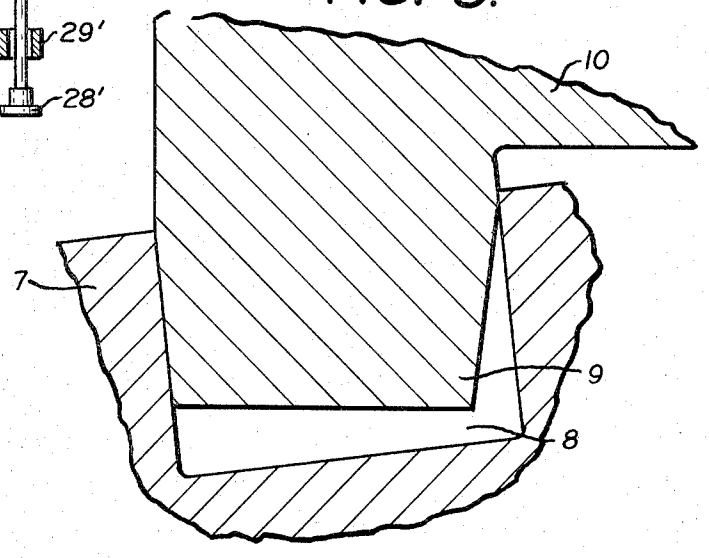

10
7
9
8

FIG. 3.

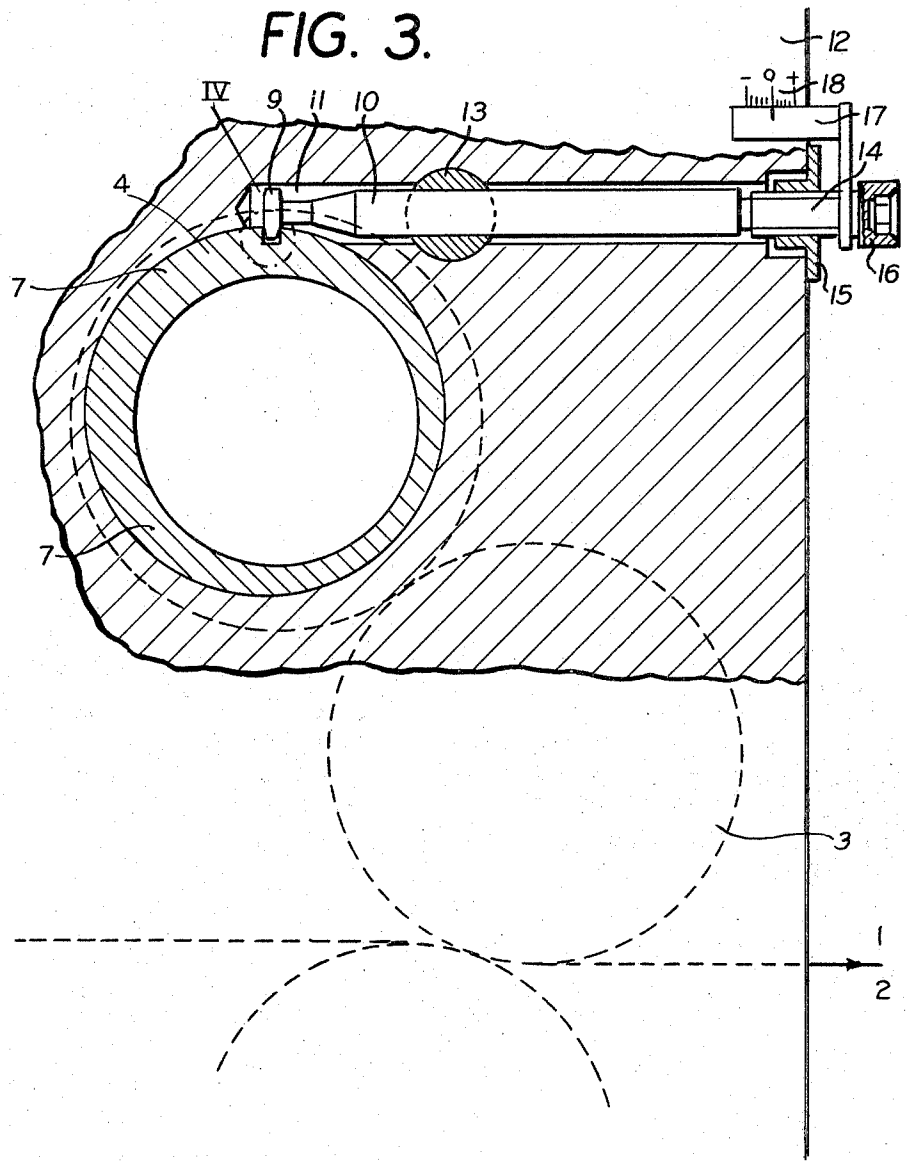
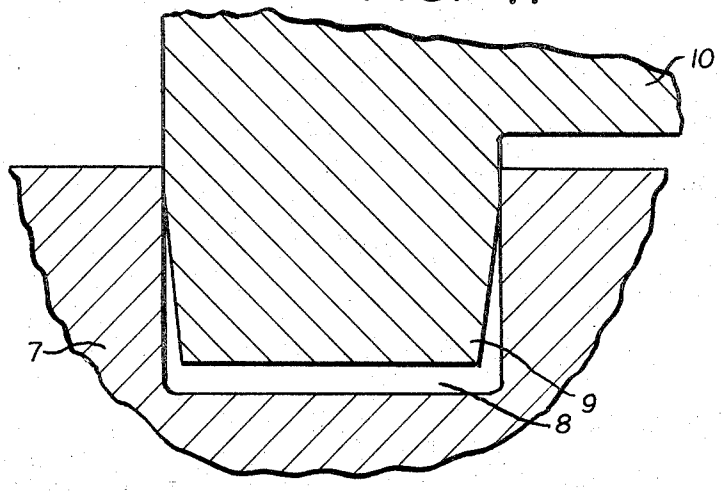


FIG. 4.



DIAGONAL REGISTER ADJUSTMENT OF PLATE CYLINDER AND APPLICATOR ROLLS IN A ROTARY PRINTING MACHINE

The present invention relates to a device for the diagonal-register adjustment of a plate cylinder and the simultaneous adaptation of the applicator rollers to the corresponding position of the plate cylinder for printing machines and particularly cylinder rotary offset printing machines.

In these machines, the printing form is clamped on the plate cylinder associated with each rubber blanket printing cylinder. For instance, in the case of cylinder rotary offset printing machines a relatively thin offset plate which is wrapped practically around the entire plate cylinder and can be locked in a clamping channel. The application of these printing plates is effected with great care and a number of devices have become known to permit carrying out this work very carefully since, particularly upon successive printings by a plurality of printing mechanisms, an insufficient alignment of the printing plate on the plate cylinder causes an improper register of the individual prints to each other. Therefore lateral and circumferential register devices have been generally known for a long time for all of these machines.

However, it may also happen that printing plates are clamped diagonally by small amounts. Several methods have been proposed in order to provide a remedy. Thus, for instance, it is known from East German Pat. No. 53,077 to arrange the clamping elements at the two ends of the printing form in a manner axially displaceable to each other, so that an easier diagonal alignment of the printing plates is possible. Since this device, however, is contained on the rotating plate cylinder, it is not possible to effect a correction during the operation of the machine, so that an interruption of the operation of the printing machine is necessary, in order to effect in each case the proper corrections, again check the register, and be able to effect further corrections.

In order to avoid this, there have become known devices in which an angular adjustment of the plate cylinder is provided. Thus, for instance, in accordance with U.S. Pat. No. 3,208,377, the angular adjustment of one of the two plate cylinder bearings is effected by means of an eccentric, the adjoining bearing positions of the ink applicator and moistening rollers being effected with a ring having eccentric slots and which follows every displacement of the plate cylinder. In this connection one starts from the premise, that the oblique position of the axis of the plate cylinder for the equalizing of the diagonal register must be effected only by an extremely small amount, so that the oblique position is necessary only by control on one of the bearings, the opposite bearing on the drive side being still able to take up this slight oblique position within its permissible tolerance. The eccentric bushing for the angular adjustment is provided in the case of this device with a toothed segment and is rotatable via a worm gear which can be actuated by hand.

In another device of this type known from West German Publication No. 1,241,464, the bearing of the plate cylinder on the operating side is also adjusted with an eccentric with the use of a worm and a toothed segment. At the same time, however, in this connection a cap connected with the eccentric is turned, to which cap there is pivoted a rod with which the adjustment

mechanism of the moistening rollers can be controlled via an eccentrically supported bell crank lever, another connecting rod, a gear rim and pinions associated with the moistening roller bearings.

In the aforementioned embodiments the high expenditure for eccentric lever and other transmission members is disadvantageous, this also bringing about inaccuracies, due to tooth clearance and the like after a certain period of wear.

From West German Petty Pat. No. 1,991,538 there is known an oblique adjusting device for the plate cylinder and the applicator rollers of a printing machine in which the adjustable bearing is also provided with an eccentric which extends out of the wall of the machine and to the outside of which a cover plate provided with a short lever arm is screwed. On the mentioned lever arm there is pivoted a bipartite push-pull rod which is guided in a threaded piece and can be moved back and forth by a handwheel, whereby the eccentric bushing, together with the cover plate, can be brought into the desired angular position. Opposite the cover plate, on the inside of the machine wall, there is located, also screwed firmly to the eccentric bushing, a reference ring which has the same diameter as the plate cylinder. The applicator rollers which are adapted to be adjusted diagonally with the plate cylinder are, in this embodiment, received in a bearing which is movable on a double lever and swingable around the inking or moistening roller arranged above it and presses by means of a stop against the reference ring fastened to the eccentric by means of a spring. The stop plates are thereby connected with the actual applicator roller bearing by means of screws and can also be held fast by additional screws, so that there is also a possibility of adjusting the applicator rollers with respect to the plate cylinder. This adjustment can, however, be effected only when the machine is stopped. The expenditure for the adjustment of the applicator rollers is therefore very great and time consuming. In order to guarantee a somewhat safe application of the stops of the applicator roller bearings against the reference ring, this apparatus furthermore requires for the pressing of the particular applicator rollers by means of a spring, a relatively high expenditure by way of machine parts, since merely the lifting of the applicator rollers off from the plate cylinder takes place by means of a power cylinder.

It is one object of the present invention, to provide a device for diagonal-register adjustment of a plate cylinder which avoids the disadvantages of the known structures.

It is another object of the present invention to provide an apparatus by which the advantages of the known structures are utilized, but which at the same time makes possible a forced movement of the particular applicator roller bearings upon the diagonal displacement of the plate cylinder. Another task, independently of this oblique adjustment, is to permit the fine adjustment of the applicator rollers with respect to the plate cylinder during the operation of the machine. Finally, there is also the task of effecting the angular adjustment of the eccentric for the diagonal adjustment in such a manner, that the previously known devices for the lateral register adjustment can be readily retained.

This result is obtained in accordance with the present invention in the manner, that the eccentric bushing for the diagonal adjustment of the plate cylinder has an

axial groove, in which a collar of a push-pull rod known for this purpose is guided and a ring provided with at least two arms is arranged loosely on the eccentric bushing between the machine wall and a securing ring fastened on the eccentric bushing. In this connection the ends of the arms pass into angle pieces provided with internally threaded bores, in which spindles for the fine adjustment of the bearings of the inking and/or moisture applying rollers are movable. The spindles are loosely guided in bearings fastened on the machine frame and each of them has at its front end a collar against which a bored lug of the corresponding applicator roller bearing comes to rest upon applying of the pressure or upon engagement of the applicator rollers.

In accordance with another feature of the present invention, the push-pull rod is arranged in a large bore in the machine frame and is guided with a cylinder bearing which is introduced into a second bore arranged transversely to the first-mentioned bore. The cross-section of the collar of the push-pull rod corresponds approximately to the cross-section of the tooth of an involute-toothed spur gear.

With these and other objects in view, which will become apparent in the following detailed description, the present invention, which is shown by example only, will be clearly understood, in connection with the accompanying drawings, in which:

FIG. 1 is a schematic elevation of the apparatus, designed in accordance with the present invention;

FIG. 2 is a fragmentary section along the lines 2—2 of FIG. 1;

FIG. 3 is another fragmentary side elevation of the apparatus designed in accordance with the present invention;

FIG. 4 is an enlarged section of the part IV of FIG. 3, in the zero position of an eccentric bushing; and

FIG. 5 is the same enlarged section as in FIG. 4, but outside of the zero position of the eccentric bushing.

Referring now to the drawings, in a rotary cylinder offset printing machine for perfecting, the web of paper 1 moves between rubber blanket cylinders 2 and 3. With each of the blanket cylinders 2 and 3 there is associated a plate cylinder 4. Around the plate cylinder 4 there are arranged applicator rollers 5 and 5', respectively, which transfer both the ink and the damping fluid to the printing plate. In the embodiment shown by way of example for the sake of simplicity, there have been omitted all applicator rollers which are provided at the points of the plate cylinder, which are tangent to the adjustment arc in the direction of which the diagonal adjustment takes place.

In addition to the known eccentric for the moving of the plate cylinder 4 towards and away from the rubber blanket cylinder 3 and for the known supporting of the plate cylinder, the entire known support of the plate cylinder shaft 6 surrounds the eccentric bushing 7. Into an axial groove 8 of this eccentric bushing 7 there extends a collar 9 of the known push-pull rod 10 which is arranged in a large bore 11 within the machine wall 12. The push-pull rod 10 is guided by a cylindrical bearing 13 which is arranged in another bore 11 provided at a right angle to the bore 11. At the other end of the push-pull rod 10, it has a threaded section 14, with which it is moved back and forth with the aid of a threaded bushing 15 fastened to the machine wall 12 and by means of a handwheel or the like 16. On the push-pull rod 10 there can also be arranged a pointer 17, which cooperates with a scale 18 arranged on the machine wall 12, which pointer and scale are shown in an enlarged view in FIG. 3, to indicate by what amount and in what direction the eccentric bushing 7 has been swung out of its zero position. On the inside of the machine wall 12, there is loosely arranged on the eccentric bushing 7 a ring 20 which is provided with two arms 19; 19' and which ring 20 is held axially by a safety ring 21 fastened on the eccentric bushing 7. The arms 19 and 19' have angle pieces 22 and 22' with which spindles 24 and 24' are movable in a threaded bore 23 and 23' respectively. Each of these spindles has a collar 25 and 25' against which there rests a lug 26 and 26' of the corresponding bearing 27 and 27', respectively, of the applicator roller, each of the lugs having a bore. Spindles 24 and 24' each have on the opposite end an adjustment knob 28 and 28' and are guided in bearings 29, and 29' respectively, fastened to the machine wall 12. The applicator roller bearings 27 and 27' are pressed via double-armed levers 30 and 30' by means of known pneumatic or hydraulic control cylinders 31 and 31' via their lugs 26 and 26' against the collar 25 and 25' of the spindles 24 and 24' respectively. Upon the stopping of the printing, the double-armed levers 30 and 30' are pulled back with the applicator roller bearings 27 and 27' by means of tension springs 32 and 32' until the lugs 26 and 26' of the corresponding applicator roller bearings 27 and 27' rest against the inside of the angle piece 22 and 22' of the arms 19 and 19', respectively. Due to the fact that each of the spindles 24 and 24' is guided in the threaded bores 23 and 23' of the angle pieces 22 and 22' which follow the oblique position, there is the possibility for the previously determined position to be assumed again entirely independently of the starting and stopping of the printing. On the other hand, however, a fine adjustment of the applicator rollers 5 and 5' can also be readily effected since, as is known, it is very necessary that in particular the moisture applicator rollers of a moistening mechanism must be precisely adjustable with respect to the plate cylinder also during the operation of the machine.

Due to the fact that the eccentric bushing 7 receives its push-pull movement in the center of its support in the machine wall 12, there is obtained the advantage over the unilaterally acting known means for adjustment, that canting is excluded, whereby an absolutely dependable and sensitive adjustment of its position is possible.

While we have disclosed several embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense.

We claim:

1. An apparatus for diagonal register adjustment of a plate cylinder and applicator rollers for printing presses, and in particular rotary cylinder offset printing presses, comprising

a machine wall,

a plate cylinder mounted in bearings, and cooperating operatively with a rubber blanket cylinder,

applicator roller for transferring ink to said plate cylinder, each of said bearings of said plate cylinder having an annularly rotatably movable eccentric bushing operatively disposed in said machine wall,

angular adjustment of said bushing setting said plate cylinder oblique to said blanket cylinder,

the eccentric bushing at an end of said plate cylinder having a substantially axial groove,

a push-pull rod longitudinally disposed in said machine wall and having a collar, means for mounting and adjusting said rod for movement to adjust the oblique position of said plate cylinder,

a portion of said collar being disposed substantially centrally of the ends of said eccentric bushing in said axial groove,

a safety ring fastened to said eccentric bushing,

a ring member having at least two substantially radially directed arms, mounted for relative movement on said eccentric bushing between said machine wall and said safety ring,

said arms of said ring member being turned at their ends into angle pieces, the latter having threaded bores,

movable spindle means for the fine adjustment of said applicator rollers being adjustably threadedly mounted in said threaded bores of said angle pieces and means for guiding the movement of said spindle means and thus the arms, upon displacement thereof by said eccentric bushing.

2. The apparatus, as set forth in claim **1,** said means for guiding includes

additional bearings disposed on said wall,

said spindle means are guided in said additional bearings, and

each of said movable spindle means has a collar at one end adjacent one of said applicator rollers.

3. The apparatus, as set forth in claim **2,** wherein the cross-section of said collar of said push-pull rod substantially corresponds with the cross-section of the tooth of an involute-toothed spur gear.

4. The apparatus, as set forth in claim **1,** wherein

said machine wall has a first bore in which said push-pull rod is disposed,

said machine wall has a second bore disposed crosswise to said first bore, and

a cylindrical bearing means recessed in said second bore for guiding said push-pull rod.

5. The apparatus, as set forth in claim **1,** wherein

said eccentric bushing is operatively disposed in said machine wall in a second bore of the latter,

said axial groove is disposed substantially along a plane which bisects the center of the width of said second bore, and

said push-pull rod is oriented substantially tangentially relative to said eccentric bushing.

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