

[54] **DEVICE FOR ATTACHING AND ADJUSTING FLEXIBLE PRINTING PLATES ON PRINTING CYLINDERS**

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 [58] Field of Search 101/415.1, 378

[56] **References Cited**

UNITED STATES PATENTS

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[57] **ABSTRACT**

A printing plate is adjustably secured to a printing cylinder by clamping bars which are adjustably mounted in an axially extending recess of the printing cylinder and which are configured to grip opposite ends of a printing plate for assuring proper alignment of registration marks on the printing plate and on the printing cylinder. A first pair of clamping bars which are adapted to first have an edge of the printing plate clamped therebetween are equipped with a pin and slot arrangement located at substantially the longitudinal center of the clamping bars. A pair of adjustment screw means are located at opposite ends of the clamping bars to permit adjustment of the ends circumferentially of the printing cylinder. The adjustment screw means are provided with indicator means to indicate the adjusted position of the clamping bars and, after the clamping bars have been placed in their adjusted position, the slotted portion of the centrally located pin and slot arrangement is axially fixed relative to the printing cylinder. The slot is configured to extend in its longitudinal direction circumferentially of the cylinder and the pin, which is spring mounted to the clamping bars, extends radially into the slot.

9 Claims, 4 Drawing Figures

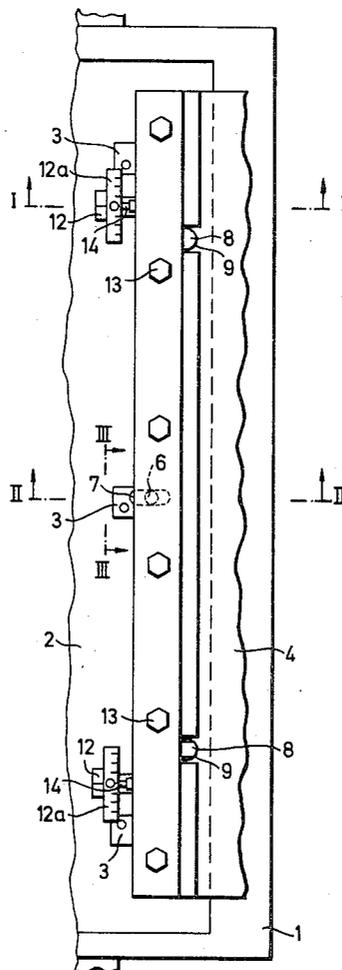
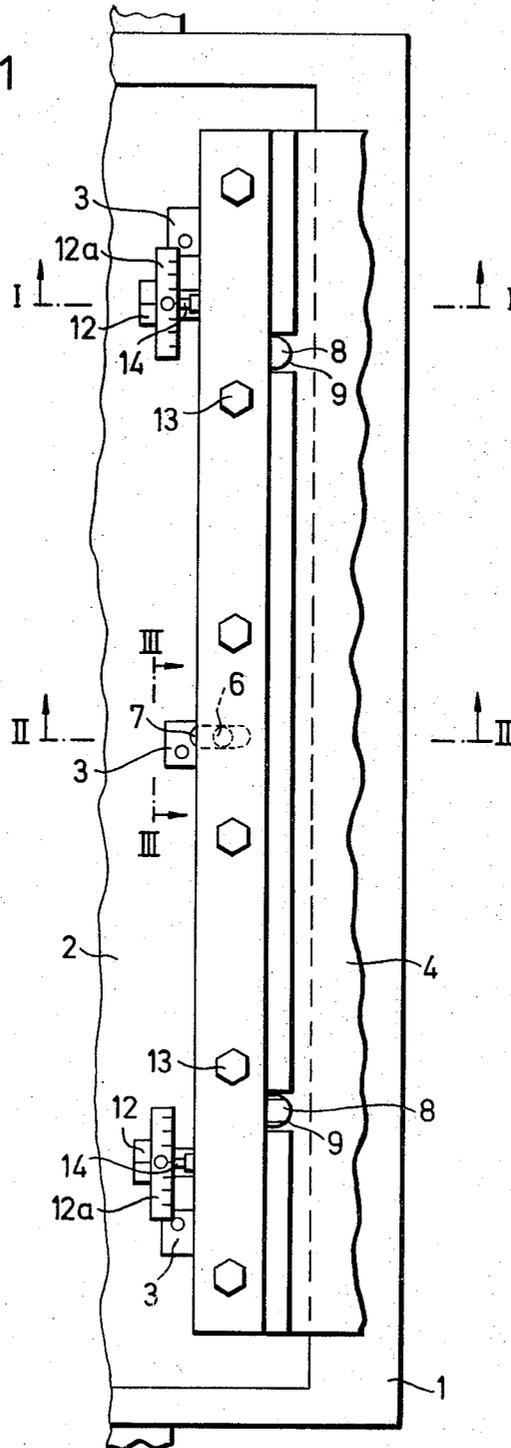
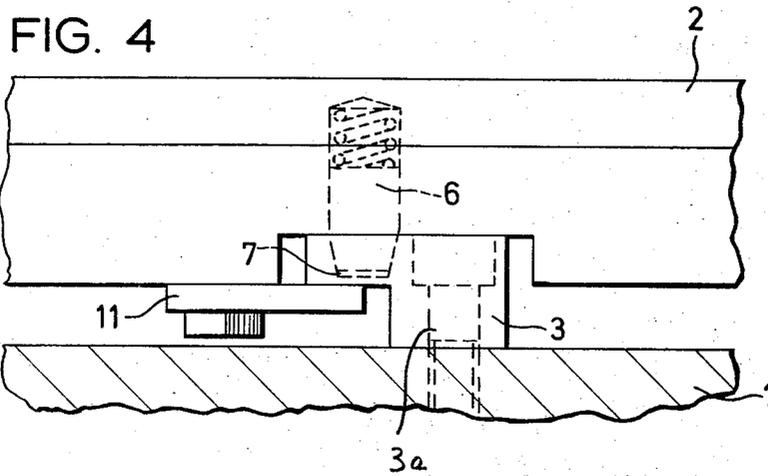
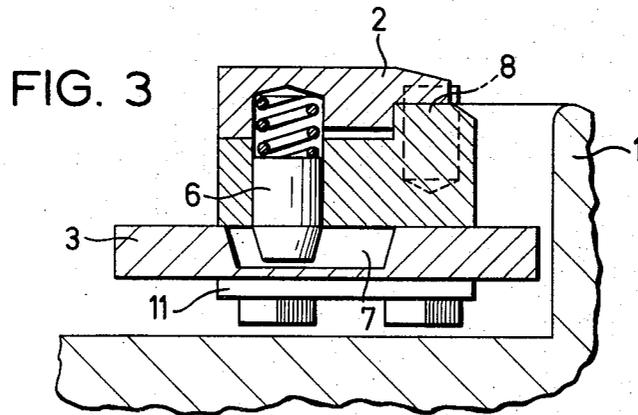
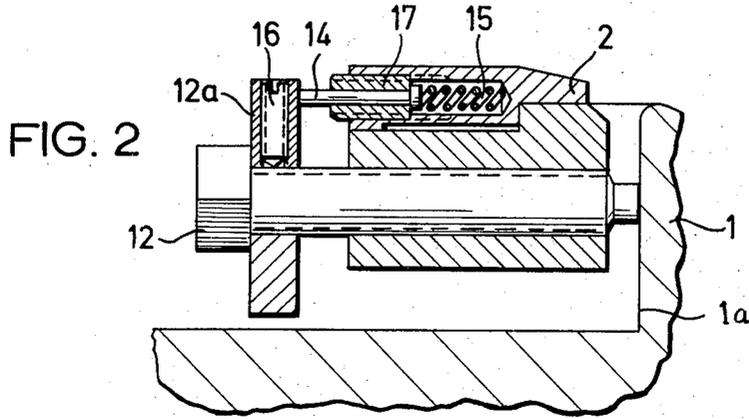


FIG. 1





DEVICE FOR ATTACHING AND ADJUSTING FLEXIBLE PRINTING PLATES ON PRINTING CYLINDERS

BACKGROUND OF THE INVENTION

The present invention generally relates to printing presses and more particularly to a device for attaching and adjusting flexible printing plates upon printing cylinders in printing presses of the rotary type. Pairs of clamping bars are adjustably mounted in an axially extending recess formed in the printing cylinder by means of adjusting screws in accordance with registration marks provided on the printing cylinder and on the printing plate. A plurality of pairs of clamping bars are provided with a first pair of clamping bars being adaptable to initially engage an edge of the printing plate. Alignment means formed on the first pair of clamping bars are adapted to mate with related alignment means formed on the edge of the printing plate to be initially engaged thereby guiding the edge between the clamping bars for attachment therebetween.

In known devices of this type, an example of which is set forth in German Pat. No. 1,786,317, the clamping bar pair initially engaging a printing plate edge is provided with two fitting pins whose ends cooperate with fitting bore holes provided in the bottom of the printing cylinder recess. With this arrangement, it is possible to adjust each printing plate without requiring excessive care on the part of an operator. However, exact engagement of the printing plate with the pair of clamping bars must be achieved by means of the mutually engaging alignment means provided on the printing plate and clamping bars. Even after a previously attached printing plate is released, all the relationships of the individual parts relative to each other will be maintained once an adjustment has been made as a result of the fitting pins and fitting bore holes which are provided. In such an arrangement, it is generally possible to dispense with proof prints. However, it may be that due to a tolerance error in the manufacture of the printing plate or in the manufacture of the fitting devices which are provided thereon for cooperation with the clamping bars, there will occur an inaccurate set-up of the printing plate resulting in an imperfect impression. When this occurs, the appropriately designed fitting pins can be loosened or released somewhat and the position of the clamping bars can be readjusted by means of adjusting screws situated therein. However, after setting of the subsequent printing plate it becomes necessary to perform a resetting operation of the pair of clamping bars by means of the adjusting screws to establish the correct initial setting and to also return the fitting pins of the clamping bars to their initial position.

It is an object of the present invention to improve and simplify the function and operation of a device of this type particularly with regard to the required operating procedures in setting up the printing plate.

SUMMARY OF THE INVENTION

Briefly, the present invention may be described as a device for adjustably securing a printing plate on a printing cylinder wherein the printing cylinder includes an axially extending recess and a plurality of pairs of clamping bars adjustably mounted in the recess for axial and tangential movement therein relative to the printing cylinder. The clamping bars are arranged for

gripping therebetween an edge of a printing plate which must be aligned relative to the printing cylinder. The printing plate and the printing cylinder include registration marks which are placed in coincident relationship when the printing plate is first gripped between the clamping bars. Interfitting alignment means are formed on the clamping bars and on the leading edge of the printing plate to direct the printing plate into initial alignment. In accordance with the present invention, the pair of clamping bars which are adapted to first have a printing plate edge clamped therebetween are provided at substantially their longitudinal center with a radially extending pin which fits into a circumferentially extending slot defined in slot-defining means adjustably mounted in the printing cylinder recess. A pair of adjustment screw means are located at the opposite ends of the clamping bars to enable adjustment thereof in directions circumferentially of the printing cylinder. The adjustment screw means are provided with indicator means to indicate the adjusted position of the clamping bars. After the adjusted position of the clamping bars has been achieved, the slot-defining means are affixed relative to the cylinder with the radially extending pin extending thereinto.

After a first printing plate has been mounted upon the printing cylinder, and the slot-defining means is affixed to the printing cylinder, the indicator means of the adjustment screw means are set at a zero position. If, upon mounting of a subsequent printing plate, it becomes necessary to readjust the position of the front clamping bars because of error tolerances in the second printing plate, this may be easily accomplished by manipulation of the adjustment screw means. When a subsequent printing plate which does not contain error tolerances is again to be mounted upon the printing cylinder, it is only necessary for the operator to manipulate the adjustment screw means to return the indicator means to zero thereby enabling a set-up of the printing plate in a fashion identical to that of the first printing plate.

As a result of the structure of the present invention, only a single fitting pin and a single slot are required as opposed to the previously required plurality of fitting bolts in bore holes. Furthermore, in the event that resetting of the clamping bars may be necessary, the present invention enables an exact predictable guidance of the clamping bars free of the obstructive restraining forces which occur in prior art devices. In prior art devices, when the fitting bolts are loosened and retightened, there may occur movement of the fitting pin that is not precisely controllable and free of obstructing forces. Moreover with the present invention, radial adjustment of the fitting pins is no longer necessary thereby eliminating this operational step from the adjusting procedure.

It is, however, preferred to arrange the centrally located fitting pin with a spring bias within the clamping bar pair with the spring force directed radially toward the printing cylinder. This is preferred due to the fact that there must necessarily exist a certain degree of play between the clamping bars and the fitting pin which is accommodated therein and with the slot-defining means connected at the bottom of the printing cylinder recess.

In this connection, it is also preferred to structure the fitting pin with a tapered extremity which extends into the circumferential slot with the slot being designed in

a correspondingly sloped configuration of lateral surfaces.

In a further aspect of the invention, the indicator means associated with the adjustment screw means located at the ends of the clamping bars are formed with a spring mounted adjustable scanning pin which extends parallel to the direction of the adjustment screw which permits circumferential relative movement of the clamping bars on the printing cylinder. The pin is adapted to engage a calibrated scale wheel or the like which is arranged upon the adjusting screw. The scanning pin will indicate the adjusted position of the clamping bars and, if deviation from the zero position has occurred as a result of readjustment for imperfect tolerances in printing plates, resetting to the original or zero position may be accomplished with ease when a new printing plate not involving imperfect tolerances is to be mounted upon the device.

It is preferred that the scanning pin, which is mounted upon the clamping bars, be arranged therein within a member which is reciprocally mounted relative to the clamping bars in the longitudinal direction of the scanning pin. In addition to enabling more accurate adjustment of the initial scanning point, this arrangement permits the device to be adapted to adjustment screws and printing plates of different lengths, thereby permitting implementation of the invention into existing rotary printing presses which may be equipped with accessories of varying dimensions. In this aspect of the invention, it is preferred to have the reciprocal member mounting the scanning pin threadedly engaged within the clamping bars for permitting reciprocal movement of the scanning pin relative to the calibrated indicator means arranged on the adjustment screw. The threads may thus be designed of any desired length to enable the device to be adapted to any differences likely to be encountered in the adjustment screw and in the printing plates.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a partial top view of a printing cylinder embodying the present invention;

FIG. 2 is a cross-sectional view taken along the line I—I of FIG. 1;

FIG. 3 is a cross-sectional view taken along the line II—II of FIG. 1; and

FIG. 4 is a side view partially in section taken along the line III—III of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, a printing cylinder 1 is provided with a recess 1a extending axially substantially over the entire length of the printing cylinder with a pair of clamping bars 2 arranged therein to be axially and tangentially movable relative to the printing cylinder 1. Although the assembly includes two clamping bar pairs, only the clamping bar pair 2 is shown for pur-

poses of illustration. Each clamping bar pair is axially and tangentially movable within predefined limits by means of guide elements 3 arranged at the bottom of the recess 1a as well as by counter-guide elements 11 correspondingly affixed to the clamping bars 2 as illustrated particularly in FIG. 4.

Each pair of clamping bars 2 is configured in two parts to accommodate therebetween one edge of a printing plate 4 which may be clamped between the pair of bars 2 by means of screws 13.

The pair of clamping bars 2 depicted in the drawings is adapted to receive therebetween the first edge of the printing plate 4 and, accordingly, the clamping bar pair illustrated in the drawings is arranged with a pair of axially spaced radially positioned bolts 8, with one of the bolts 8 being configured with oppositely facing flattened sides. The edge of the printing plate 4 is structured to include a pair of recesses 9 which correspond exactly to the thicknesses of the bolts 8 in such a manner that, after insertion of the printing plate 4 into the respective pair of clamping bars 2, the bolts 8 and the recesses 9 operate as interfitting alignment means to position the printing plate accurately relative to the clamping bars. Flattening of the sides of one of the bolts 8 is intended to compensate for the possibility of slight curvatures which may occur in the printing plate upon clamping thereof between the pair of clamping bars 2.

Moreover, each of the clamping bars 2 are provided with a series of adjusting screws 12 which are located for engagement against the side walls of the recess 1a of the printing cylinder 1 in order to enable adjustable positioning of the clamping bars 2 and of the printing plate 4 with respect to the printing cylinder.

The adjusting screws 12 are provided with calibrated dials or wheels 12a which are connected with the adjusting screws in such a manner that they will indicate a zero position when correctly adjusted.

A fitting pin 6 having a conically-shaped lower end is centrally spring mounted in the clamping bars 2 in a position to extend radially relative to the printing cylinder into engagement with a correspondingly sloped slot 7 defined within a central guide piece 3. The slot 7 extends in its longitudinal direction circumferentially of the printing cylinder and, as shown in FIG. 4, comprises a width corresponding to the thickness of the fitting pin 6. Accordingly, it will be seen that the fitting pin will be longitudinally slidable relative to the slot 7.

A scanning pointer 14 is mounted at opposite ends of the clamping bars 2 to extend circumferentially relative to the printing cylinder 1. A spring 15 applies a spring force biasing the pointer 14 against one of the associated calibrated dials 12a which is adjustably fixedly mounted by means of a set screw 16 upon an adjusting screw 12. The scanning pin 14 is not directly mounted in the clamping bars 2 but is instead situated within a cartridge member 17 which is threadedly engaged by screw means within the clamping bars 2.

In the operation of the device of the present invention the edge of the printing plate 4 having the recesses 9 formed therein is first firmly inserted between the clamping bars 2 until the recesses 9 abut against the bolts 8. Thereupon, the clamping bars 2 are firmly clamped together to hold the edge of the printing plate 4 therebetween by means of screws 13 which are first loosened to permit insertion of the printing plate edge and which are then tightened to effect a firm clamping

engagement. Subsequently, the printing cylinder 1 is permitted to turn through almost one complete revolution following which the opposite edge of the printing plate 4 is inserted in an identical manner between a pair of clamping bars (not shown) opposite the clamping bars 2 described above which have received the first edge of the printing plate. The second set of clamping bars are also situated in the recess 1a of the printing cylinder and they will cooperate with the illustrated pair of clamping bars 2 to firmly hold therebetween the opposite edge of the printing plate 4.

At this point, registration marks provided on the printing plate and on the printing cylinder are precisely aligned by manipulation of the adjusting screws 12 located in both pairs of clamping bars. If necessary, a proof or trial print may be made to determine the accuracy of the set-up. If it is found that the set-up is precisely correct, the guide piece 3 is then fastened relative to the printing cylinder 1 by means, for example, of a mounting screw 3a shown in dotted line form in FIG. 4. The guide piece 3 is permitted to remain in the loosened condition prior to determining the precision with which the set-up has been made and it will be seen that after tightening of the screw 3a, the circumferentially extending slot 7 will permit circumferential movement of the clamping bars 2 but will resist axial movement thereof.

After the position of the clamping bars 2 has been correctly determined, the dials 12a are clamped by means of the set screws 16 upon the adjusting screws 12 with the dials in the zero position relative to the scanning pointers 14. Moreover, the scanning pointers 14 are adjusted in such a manner that by a corresponding rotation of the member 17 the pointers 14 will perpendicularly engage the dials 12a.

From the foregoing, it will be seen that the clamping bars 2 will be firmly secured relative to the printing cylinder 1 despite release after printing of the printing plate 4 from between the clamping bars by loosening of the screws 13. Accordingly, after insertion and securing of a new printing plate between the pairs of clamping bars, there will be obtained a correct setting of the device thereby obviating the necessity for resetting of the printing plate or of the clamping bars and eliminating the need for making new proof or trial prints.

However, if it should occur that under exceptional circumstances a difference in the printing set-up is experienced, it will be possible to readjust the device by manipulation of the adjusting screws 12. Thus, when a printing plate containing inaccurate dimensional tolerances is inserted, readjustment can be readily carried out by means of the adjusting screws 12 with the fitting pin 6 sliding longitudinally along the slot 7 in the circumferential direction of the printing cylinder. When adjustment to accommodate for such an inaccurately dimensioned printing plate is necessitated, the adjusting screws 12 will be manipulated so that the indicating means 12a are moved from their zero position. After the inaccurately dimensioned printing plate is removed, and a subsequent printing plate not containing dimensional inaccuracies is reinserted, all that will be necessary is for the operator to readjust the adjusting screws 12 to bring the indicator means 12a back to the zero position relative to the scanning pointers 14. The need for readjustment will be plainly apparent by the relative position existing between the scanning pointers 14 and the indicator means 12a. Thus, adjustment for

incorrect tolerances may be readily accomplished with the inherently correct positioning of the members being subsequently obtained with ease merely by adjustment of the screws 12.

Furthermore, it will be seen that the circumferentially reciprocal cartridge member 17 permits the device to be adapted for utilization with adjusting screws of different lengths and with different printing plates thereby advantageously enabling the device to be utilized with printing cylinders of various types and with different printing plates and adjustment screws.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. In a device for adjustably securing a printing plate on a printing cylinder, said printing cylinder including an axially extending recess and a plurality of pairs of clamping bars adjustably mounted in said recess for axial and tangential movement therein relative to said printing cylinder, said clamping bars being arranged for gripping therebetween an edge of said printing plate aligned relative to said printing cylinder in accordance with registration marks appearing on said printing plate and printing cylinder, with alignment means formed on a first pair of said clamping bars which are adapted to first have a printing plate edge clamped therebetween, said alignment means being arranged to mate with related alignment means formed on said first clamped printing plate edge for guiding said printing plate into clamped engagement with said clamping bars, the improvement comprising, in combination, a pin attached at said first clamping bars at substantially the longitudinal center thereof, means located in said recess defining a slot extending generally circumferentially of said printing cylinder, said slot-defining means being positioned relative to said cylinder to locate said slot with said pin extending thereinto, a pair of adjustment screw means operatively associated with said first clamping bar pair at opposite ends thereof to effect adjustment of said clamping bars circumferentially of said printing cylinder, said adjustment screw means including indicator means to indicate the adjusted position of said clamping bars, and means enabling said slot-defining means to be adjustably fixed relative to said printing cylinder after said printing plate has been accurately mounted thereupon.

2. A device according to claim 1, wherein said pin is spring mounted upon said clamping bars to extend in a direction radially of said printing cylinder.

3. A device according to claim 1, wherein said pin is formed in a tapered configuration extending into said slot, said slot being also formed with a correspondingly shaped tapered configuration.

4. A device according to claim 1, wherein said indicator means include a spring mounted adjustable scanning pointer extending parallel to said adjustment screw means associated therewith, and calibrated dial means mounted upon said adjustment screw means in a position for engagement with said scanning pointer.

5. A device according to claim 4, wherein said scanning pointer is mounted within a reciprocal member arranged upon said clamping bars for reciprocating

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movement relative thereto in the longitudinal direction of the scanning pointer.

6. A device according to claim 5, wherein said reciprocal member is threadedly engaged by screw means within said clamping bars to enable adjustable reciprocating movement thereof.

7. A device according to claim 1, wherein said indicator means are adjustably fixed relative to said adjustment screw means.

8. A device according to claim 1, wherein said adjustment screw means comprise a pair of longitudinal screws extending in a direction circumferentially of said printing cylinder, said screws being adjustably

mounted upon said clamping bars to engage a wall of said axially extending recess whereby manipulation of said screws will effect movement of the end of said clamping bars upon which said screw is mounted relative to said printing cylinder in a direction extending circumferentially thereof.

9. A device according to claim 1, wherein said pin is arranged for sliding engagement within said slot in a direction extending circumferentially of said printing cylinder, with movement of said pin axially of said printing cylinder being prevented by the engagement of said pin within said slot.

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