June 7, 1966 J. C. MOTTER 3,254,598

LEVELING INDICATOR FOR A PRINTING PRESS

Filed Aug. 30, 1963 3 Sheets-Sheet 1

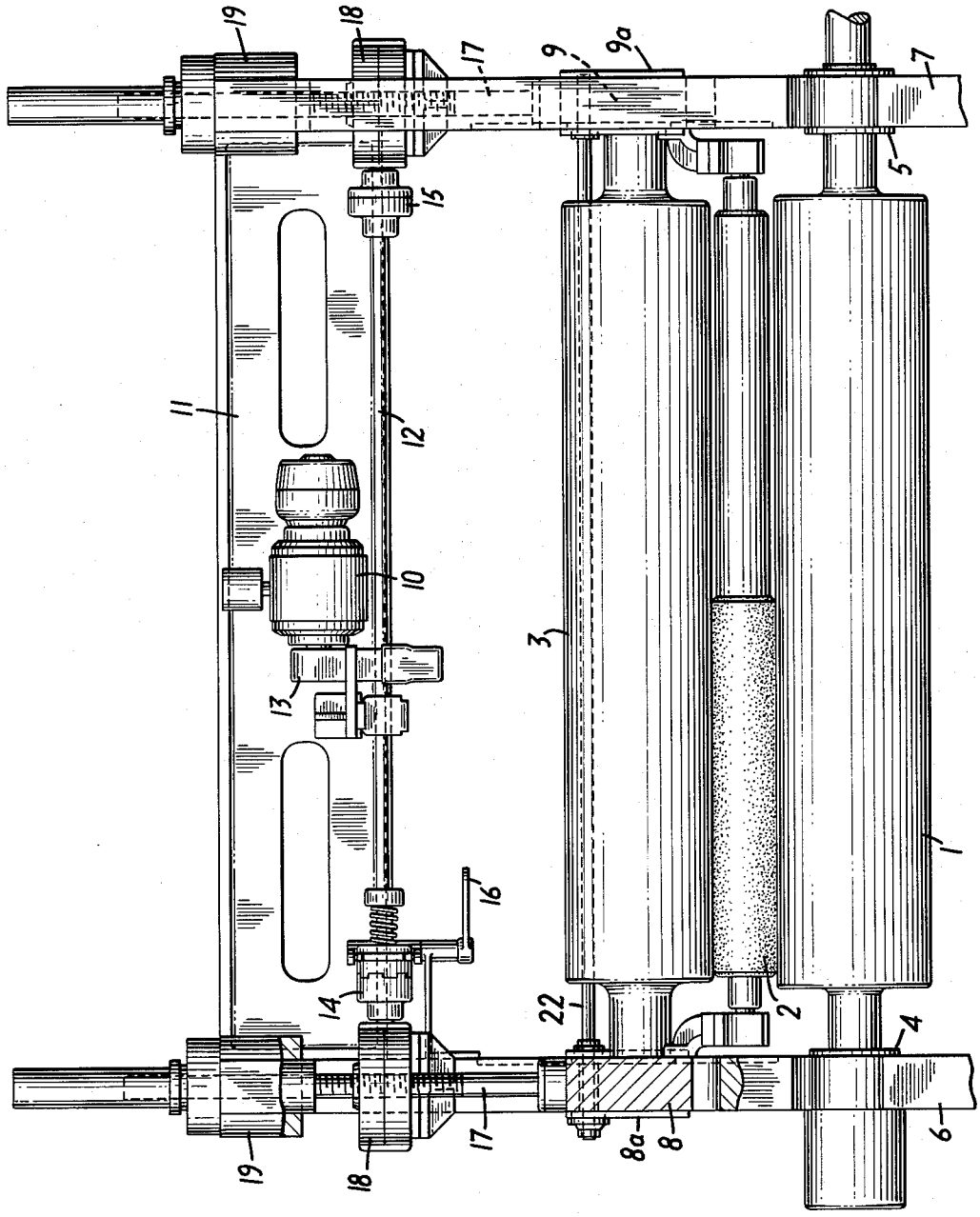


FIG. 1

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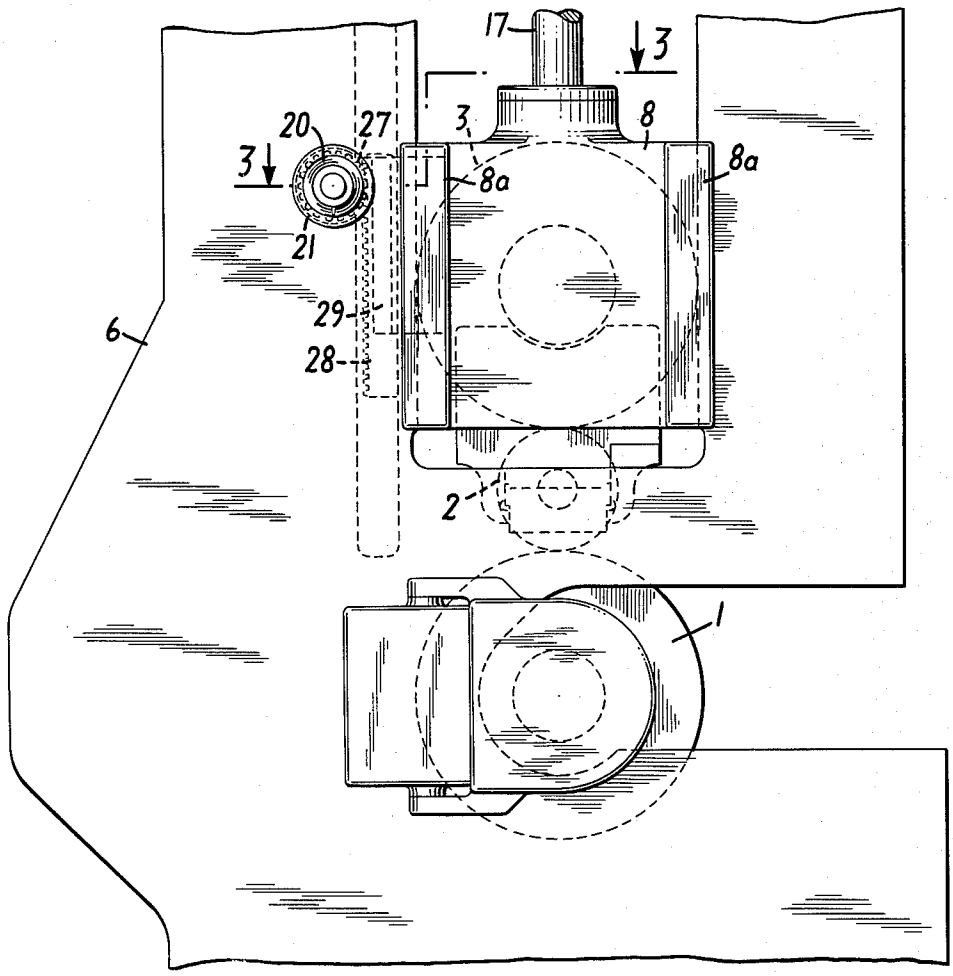


FIG. 2

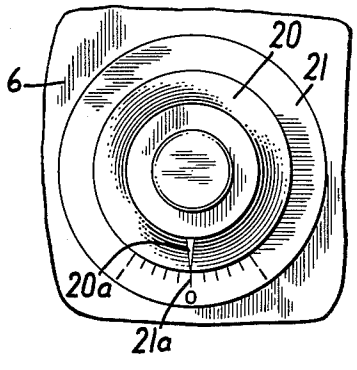


FIG. 2A

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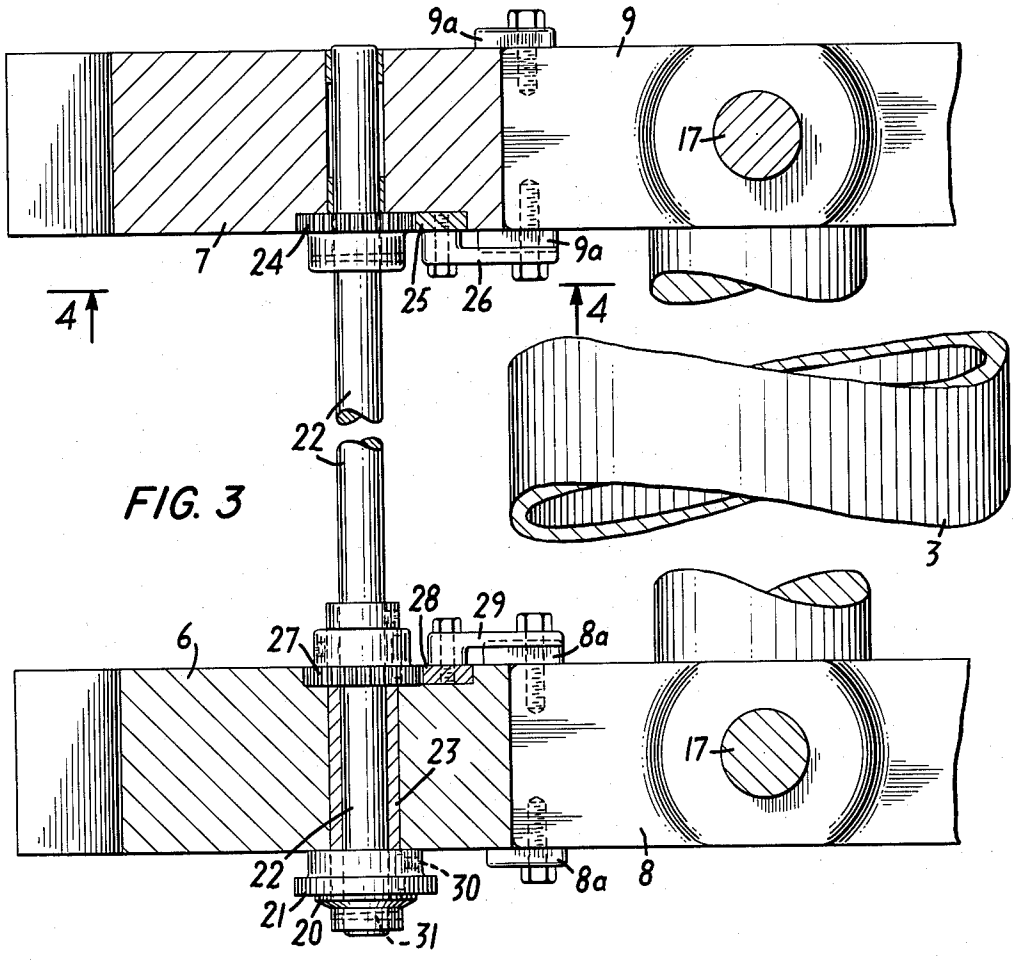


FIG. 3

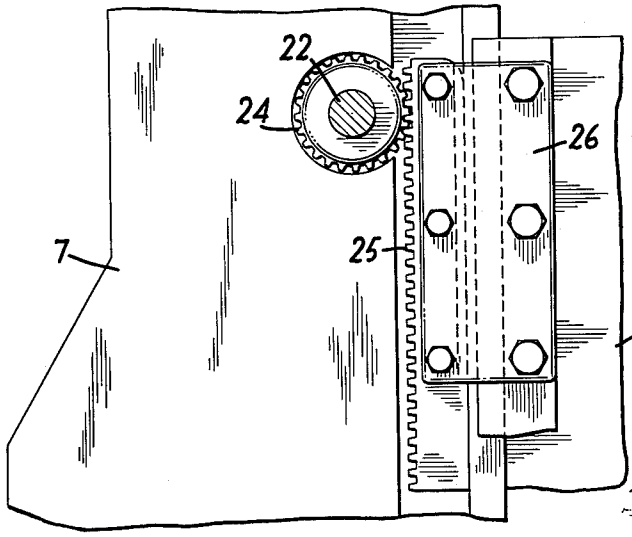


FIG. 4

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LEVELING INDICATOR FOR A PRINTING PRESS

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5 Claims. (Cl. 101—216)

This invention relates to improvements in printing presses, and more particularly to a novel indicating device for checking the parallel relation between the axes of the rotatable elements forming a printing couple.

The indicating device of the present invention is applicable to a conventional printing press, such as a rotogravure printing press, in which an impression roller is supported between a pair of movable supporting frames which are adjustable to carry the impression roller toward or away from a printing cylinder mounted for rotation on a fixed axis.

In a conventional rotogravure printing press, the paper web is fed between a rotating printing cylinder and a rotating impression roller in tangential relationship with the printing cylinder, and ink impressions are printed on the paper web by utilizing depressions in the printing cylinder while the impression roller provides the desired pressure between the paper web and the printing surfaces of the printing cylinder. The impression roller is mounted between a pair of movable supporting frames which are guided for movement in the side frames of the printing press, and these supportng frames carry the impression roller toward or away from the printing cylinder. In large presses, these supporting frames are driven by a motor through a clutch so that the supporting frames can be moved in unison or one of the supporting frames can be moved separately to orient the axis of the impression roller relative to the axis of the printing cylinder. In moving the impression roller toward the printing cylinder, spring forces are built up and act on the supporting frames as soon as the movement of the impression roller is resisted by the printing cylinder. Therefore, when the impression roller is in operative, tangential relationship with the printing cylinder, the pressure engagement between the impression roller and the printing surfaces of the printing cylinder is determined by these spring forces.

In printing paper webs of full width, it is customary to use a full length impression roller. From time to time, it becomes necessary to convert the press to print on a narrower web of paper from less than the full length of the printing cylinder, and in such instances, a shorter impression roller is employed to avoid direct contact between the printing cylinder and the impression roller beyond the edge of the paper web. When it has been necessary to use impression rollers of less than full length, the press operators have encountered difficulty in obtaining uniform pressure between the impression roller and the printing cylinder throughout the length of the bite between the cylinders because of the tendency of the impression roller to tilt while it is brought into the desired pressure engagement with the printing cylinder. More specifically, when the shorter impression roller is moved by power into operative position with respect to the printing cylinder and substantially equal spring forces are exerted at opposite ends of the impression roller through the supporting frames, there is less resistance to the spring pressure at the short end than at the full length end, causing the supporting frame at the short end to travel a greater distance than the supporting frame at the full length end before sufficient spring pressure is built up, thereby tilting the axis of the impression roller downwardly at the short end thereof. The tilted relation of the impression roller to the printing cylinder produces higher pressure, and therefore heavier impressions and excessive wear, between the impression roller and the printing cylinder at the short end and lighter pressure, and therefore lighter impressions, at the full length end.

The purpose of the indicating device of the present invention is to forewarn the operator of a tilted condition of the impression roller and also to help him correct it. Toward this end, the indicating device has two movable indicators, each indicating the position of one of the supporting frames which carry the impression roller. Each indicator is connected through a drive transmission with one of the supporting frames, so that the movement of each supporting frame imparts movement to the respective indicator. When the relative positions of the supporting frames are such that the axis of the impression roller is in parallel relation with the axis of the printing cylinder, the indicators will be in alignment or in predetermined relative positions, so that the operator can tell at a glance if the axis of the impression roller is or is not in parallel relation with the axis of the printing cylinder. The indicators are located for ready comparison by the operator, and the operator, by referring to the indicators when bringing a short impression roller into operative position with a printing cylinder, can easily adjust the relative positions of the supporting frames to correct a tilted impression roller and insure that uniform impressions will be obtained across the width of the printed web.

For a complete understanding of the present invention, reference can be made to the detailed description which follows, and to the accompanying drawings in which:

FIGURE 1 is a front view of a printing press equipped with the indicating device of the present invention;

FIGURE 2 is an enlarged side elevation of part of the printing press shown in FIGURE 1;

FIGURE 2A is an enlarged view of the indicators shown in FIGURE 2;

FIGURE 3 is a sectional view taken along the line 3—3 of FIGURE 2, looking in the direction of the arrows, and

FIGURE 4 is a sectional view taken along the line 4—4 of FIGURE 3, looking in the direction of the arrows.

In the drawings, the indicating device of the present invention is shown installed on a conventional rotogravure printing press. The printing press comprises a printing cylinder **1**, an impression roller **2** (shown in FIGURE 1 as "shortened" at the right end by a reduction in diameter so that only the left end thereof is in pressure engagement with the printing cylinder), and an impression backup cylinder **3** for the impression roller. The printing cylinder **1** is supported for rotation in bearings **4** and **5** mounted in the side frames **6** and **7** of the press. The impression roller and the backup cylinder are supported for rotation between vertically movable supporting frames **8** and **9**. The supporting frame **8** is equipped with gibs **8***a* which guide it for vertical movement in the side frame **6**, and the supporting frame **9** is equipped with gibs **9***a* which guide it for vertical movement in the side frame **7**.

Referring to FIGURE 1, the supporting frames **8** and **9** are movable in their respective side frames to translate the impression roller and backup cylinder toward and away from the printing cylinder under the power of a motor **10** supported from a cross-beam **11** suspended between the side frames at the top of the press. A shaft **12**, supported for rotation between the side frames of the press above the impression and backup rollers, is driven in either direction by the motor **10** through a gear transmission enclosed within a housing **13**. One end of the shaft **12** transmits motion through a clutch **14** to raise or lower the supporting frame **8** and the other end of the shaft **12** transmits motion through a coupling **15** to raise or lower the supporting frame **9**. The clutch **14** is engaged and disengaged by the actuation of a lever **16**. When the clutch **14** is engaged, the motor imparts motion

to both supporting frames in unison. When the clutch is disengaged, the motor remains operatively connected to the supporting frame **9**, but it is disconnected from the supporting frame **8**. It is apparent that by disengaging the clutch the supporting frames can be adjusted relative to each other to change the angle of the axis of rotation of the impression roller **2**.

The means for translating the rotational movement of the shaft **12** into vertical movement of the supporting frames **8** and **9** is conventional and need not be described herein in detail. For present purposes it suffices to say that each of the supporting frames **8** and **9** is supported from the lower end of a vertically disposed screw **17**. Each of the screws extends upwardly from the respective supporting frame and passes through a gear housing **18**, and the upper end of the screw is accommodated within a housing **19** containing a spring. The gear housing **18** contains a gear system through which upward and downward motion is imparted to the screws **17** depending on the direction of rotation of the shaft **12**. When the screws **17** are moving downwardly to carry the impression roller into operative position with the printing cylinder and the further downward movement of the impression roller is resisted by the printing cylinder, the springs within the housings **19** begin to build up spring forces which increase to predetermined values before the motor **10** is automatically cut off, and these spring forces are transmitted to opposite ends of the impression roller through the screws **17** and the respective supporting frames.

When a full length roller is carried between the supporting frames **8** and **9**, the substantially equal spring forces which are transmitted to opposite ends of the impression roller through the supporting frames **8** and **9** produce a relatively uniform impression along the entire length of the bite between the printing cylinder and impression roller. However, as explained above, when an impression roller short at one end is substituted for the full length impression roller, the axis of the impression roller may tend to tilt by reason of the over-travel of the supporting frame **9** at the short end of the impression roller, causing excessive wear and heavy impressions on the right end (as viewed in FIGURE 1) of the paper web passing between the printing cylinder and the impression roller and lighter impressions at the full length end at the left.

In order to forewarn the operator of a tilted impression roller and to facilitate the relative adjustment of the supporting frames **8** and **9** to bring the axis of a tilted impression roller back into parallel relationship with the axis of the printing cylinder, the printing press, according to the present invention, is provided with a pair of dials or indicators **20** and **21** (see FIGURE 2A) which rotate on a common axis. Each dial is connected through a drive transmission with one of the movable supporting frames **8** and **9** so that the vertical movement of the supporting frame imparts rotation to the respective dial. The drive transmissions include inner and outer concentric shafts **22** and **23**, respectively, a pinion **24** affixed to a protruding end of the inner shaft, a vertically movable rack **25** meshing with the pinion **24** and attached to the supporting frame **9** by a bracket **26**, a pinion **27** affixed to the outer shaft **23**, and a vertically movable rack **28** meshing with the pinion **27** and attached to the supporting frame **8** by a bracket **29**.

The outer shaft **23** is accommodated for rotation within the side frame **6**, and the ends of the shaft extend beyond the inner and outer surfaces of the side frame. The pinion **27** is affixed to the end of the shaft **23** protruding from the inner face of the side frame **6**, and the indicator **21** is affixed by a set screw **30** to the opposite end protruding from the outer face of the side frame. The inner shaft is suspended between the side frames **6** and **7**, and both ends protrude beyond the ends of the outer shaft **23**. The shaft **22** is accommodated for rotation within the outer shaft **23** and within the side frame **7**. The pinion **24** is affixed to the end of shaft **22** adjacent the inner face of the side frame **7**, and the indicator **20** is affixed by a tapered pin **31** to the opposite end adjacent the dial **21**. The pinions **24** and **27** are accommodated within circular recesses and the racks **25** and **28** are accommodated within relatively long recesses of the side frames.

As the supporting frame **9**, which carries one end of the impression roller, travels upwardly and downwardly, the rack **25** carried therewith imparts rotation to the pinion **24** which, in turn, imparts rotation to the indicator **20** through the shaft **22**. As the supporting frame **8**, which carries the other end of the impression roller, travels upwardly and downwardly, the rack **28** carried therewith imparts rotation to the pinion **27** which, in turn, imparts rotation to the indicator **21** through the shaft **23**. Since the pinions **24** and **27** have the same number of teeth, each revolution of the indicators **20** and **21** will indicate equal displacements of their respective supporting frames **9** and **8**.

The indicating dials each have a reference mark thereon and when these reference marks line up, the axes of the impression roller and printing cylinder are parallel, and when they do not line up their axes are not parallel. Toward this end, the inner indicating dial **20** carries a pointer **20***a* (see FIGURE 2A) which extends outwardly toward the outer periphery of the dial, and the outer dial **21** carries a "zero" reference line **21***a* and a series of equally spaced reference lines on either side thereof. The outer indicating dial **21** is preset on the shaft **23** so that when the relationship between the supporting frames **8** and **9** is such that the axis of the impression roller **2** is parallel with the axis of the printing cylinder, the pointer **20***a* is in alignment with the "zero" reference mark **21***a*. If, in bringing a short impression roller into operative engagement with the printing cylinder, one of the supporting frames overrides the position at which it would be normally stopped if the supporting frames were carrying a full length impression roller, the operator will be immediately forewarned of the tilted condition of the impression roller by the misalignment between the pointer **20***a* and the reference mark **21***a* of the indicator dials **20** and **21**, respectively. In such case, the operator, by referring to the indicator dials, can adjust the relative positions of the supporting frames to correct the tilted impression roller and insure that uniform impressions will be obtained across the width of the printed web by disengaging the clutch **14** and moving the supporting frame **9** until the reference pointer **20***a* is brought back into alignment with the "zero" reference mark **21***a* of the indicator dial **21**.

The invention has been shown in a single preferred form and by way of example only, and obviously, many modifications and variations can be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any particular form or embodiment except insofar as such limitations are expressly set forth in the appended claims.

I claim:

1. In a printing press which includes a printing cylinder, an impression roller movable toward and away from the printing cylinder, a pair of movable supporting frames for carrying the impression roller of the printing press between them, and means for moving the supporting frames toward and away from the printing cylinder and applying a spring force on each of the supporting frames after the impression roller is brought into pressure engagement with the printing cylinder, means for indicating the relationship of the axes of the printing cylinder and the impression roller comprising a pair of movable indicators, the relative positions of which indicate the condition of the axis of the impression roller carried by the supporting frames, a pair of concentric shafts, one imparting movement to one of the indicators and the other im-

parting movement to the other of the indicators, the inner of the concentric shafts extending beyond the outer shaft at both ends, one end of each shaft in driving relationship to a different one of the indicators, a pinion affixed to the opposite end of each shaft, and a rack carried by each supporting frame and meshing with one of the pinions throughout the range of movement of the supporting frames, whereby the movement of each of the supporting frames imparts movement to the respective indicator.

2. A rotogravure printing press comprising a pair of side frames, a printing cylinder supported between the side frames for rotation, an impression roller, a pair of supporting frames guided for movement within the side frames and supporting the impression roller therebetween, drive means for imparting movement to the supporting frames in unison or for imparting movement to one of the supporting frames relative to the other, means for moving the supporting frames toward and away fom the printing cylinder and applying a spring force on each of the supporting frames after the impression roller is brought into pressure engagement with the printing cylinder, a pair of dials rotatable on a common axis and adjacent one of the supporting frames, concentric rotatable shafts, each carrying one of the dials, a drive transmission connecting the outer shaft with the one supporting frame guided for movement in the side frame nearest the dials, the inner shaft extending to the opposite side frame, and a drive transmission connecting the inner shaft with the other supporting frame guided for movement in the side frame furthest away from the dials, said drive transmissions being in driving relation with said respective supporting frames throughout the range of movement of the supporting frames.

3. A printing press as set forth in claim 2 in which each drive transmission includes a pinion carried by the respective shaft and a rack carried by the respective supporting frame and in driving relation with said pinion throughout the range of movement of the supporting frame.

4. A printing press as set forth in claim 3 including recesses within the side frames for accommodating the rack and pinion therein.

5. A printing press as set forth in claim 2 including a mark on each of the concentric dials which are aligned when the axis of the impression roller is parallel to the axis of the printing cylinder.

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