

June 15, 1965

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3,188,952

HOLDING AND ADJUSTING MEANS FOR PRINTING MEMBERS

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3 Sheets-Sheet 1

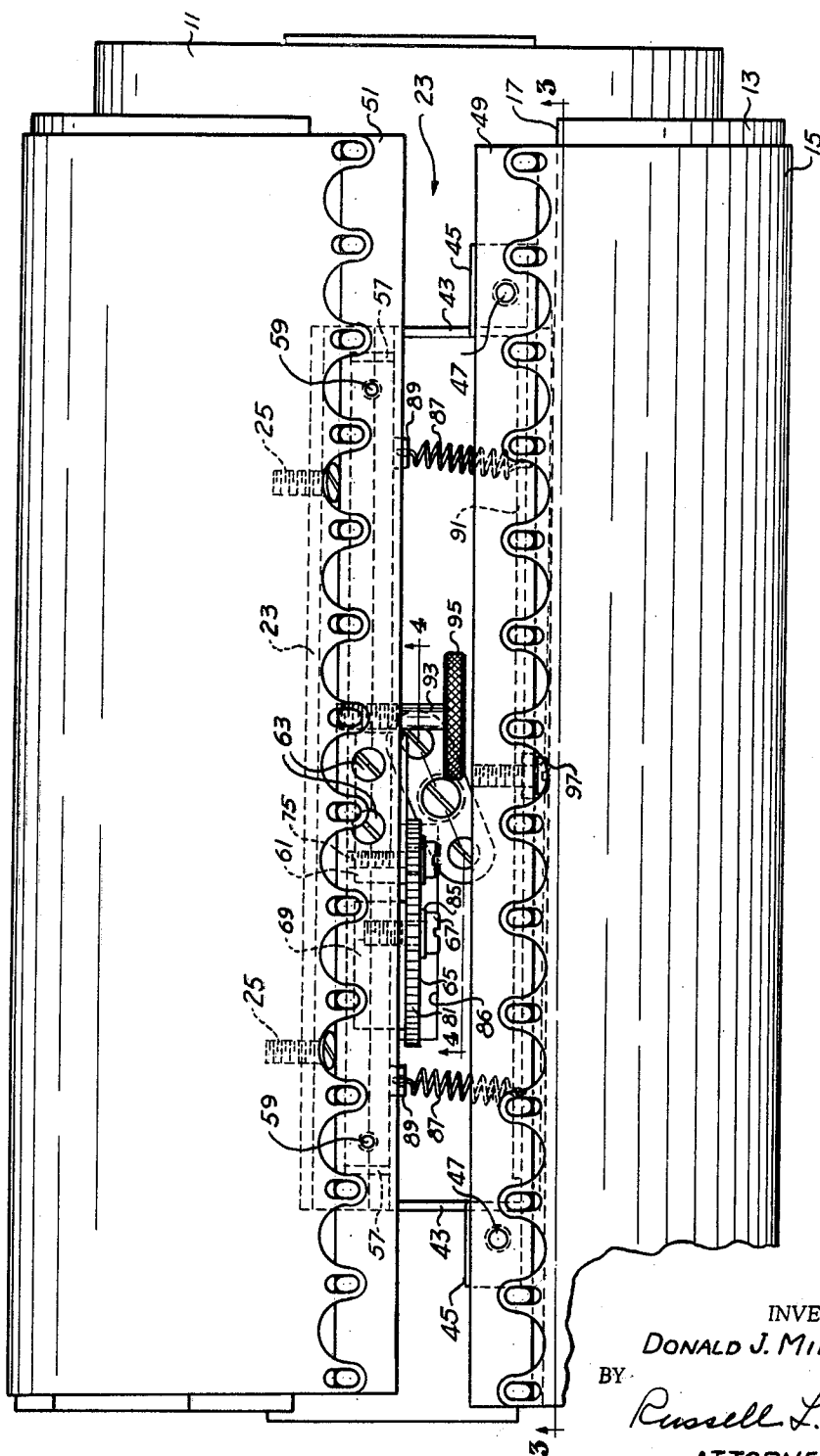


Fig. 1

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3 Sheets-Sheet 2

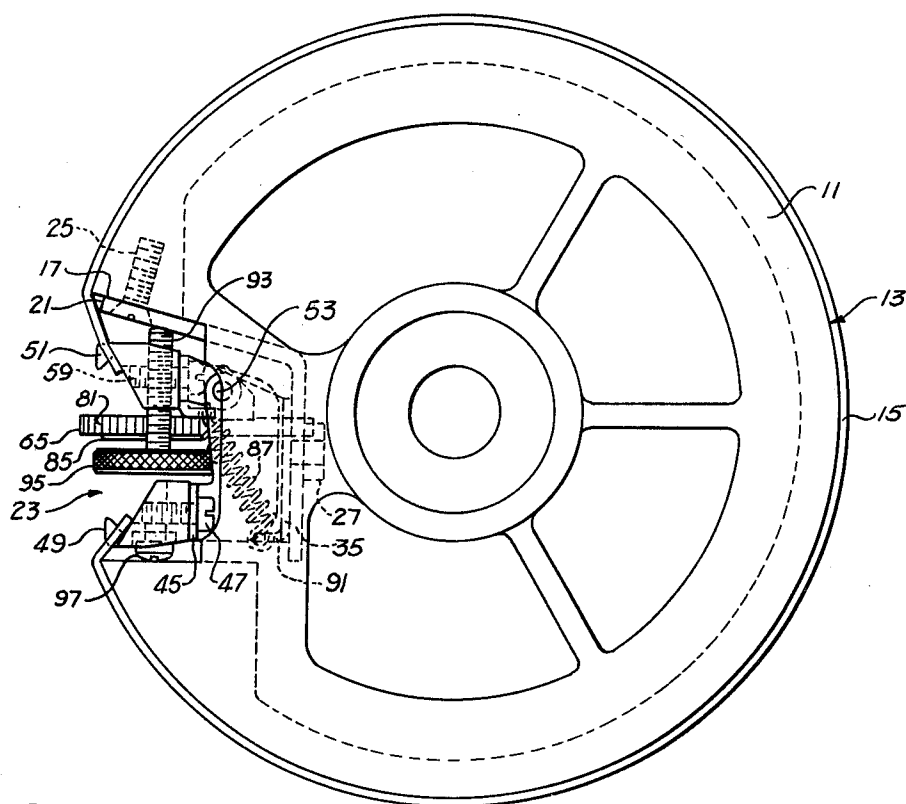


Fig. 2

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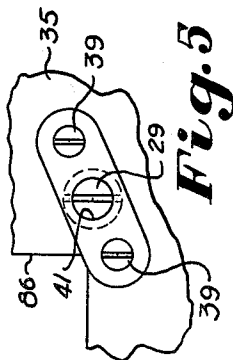
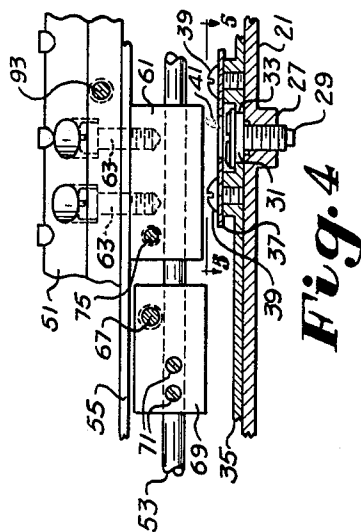
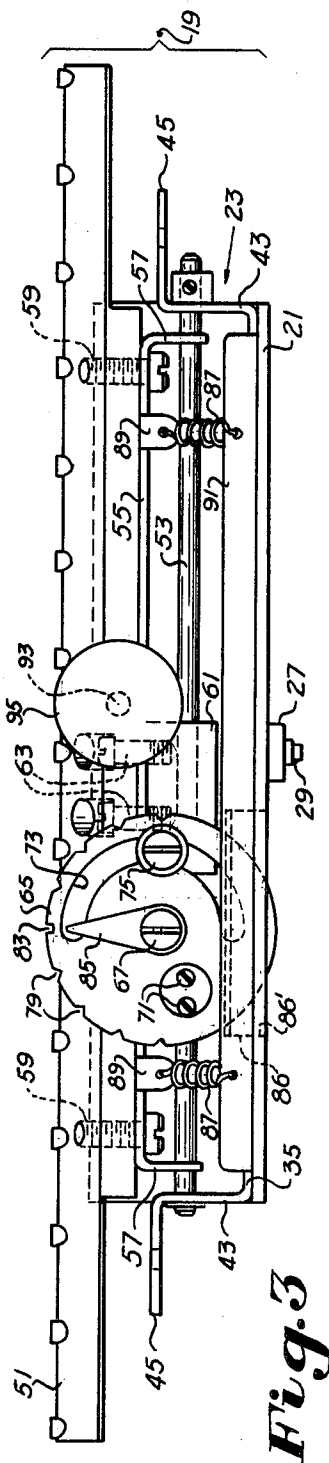
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3 Sheets-Sheet 3



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HOLDING AND ADJUSTING MEANS FOR PRINTING MEMBERS

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9 Claims. (Cl. 101-415.1)

This invention relates to means for adjusting and holding a flexible member in desired position on the cylinder of a printing machine. It is especially useful in connection with holding lithographic plates under proper tension and with the image in accurate position.

With certain classes of printing it is very important that the image be located accurately with reference to the paper to be printed, as for instance, where the image has straight lines which should be parallel with the marginal edge of the paper, where inaccuracies in position of the imprint would be readily observable, or in cases where registration is desired with another imprint. Sometimes the image is inaccurately photographed on the plate. Sometimes the two edges of the plate are not absolutely parallel or at absolutely right angles to the end of the plate, and hence, an image placed on the plate with reference to one of the edges may not be in the desired accurate position with reference to the paper being printed.

Various devices have been proposed heretofore for mounting the plate on the drum in such a way that it can be shifted to skew the plate slightly and thus properly align a misplaced image and cause it to print in correct relation to the edges of the paper. Some of these devices position the plate by sliding the plate ends axially of the drum in opposite directions and hence tend to distort the plate and impose a tension along one diagonal with a corresponding relaxation along the other. Other devices provide for both axial sliding and rocking movement of the means holding the plate ends, but require plural individual adjustments at each end, so that, while an accurate, even tension on the plate can be approximated, it requires a modicum of skill and experience to achieve. These adjustments are further complicated by the fact that the printing member must be properly tensioned after it is in adjusted position, and the tensioning should affect all parts of the member uniformly and still not impair the adjustment. A further complexity which characterizes the situation is found in the fact that accurate image placement is best tested by running sample copies. To do this the plate must be tensioned. If the adjusted position is found incorrect, a relaxation of the plate tension for making a new adjustment normally affects the existing angular or skewness setting, so that it is difficult to insure that any subsequent adjustment will be a substantial improvement over the one just previous. For this reason progressive refinement of the skewness adjustment, if achieved, is largely a matter of chance. Other devices are so complex and costly as to rule them out for the majority of applications.

It is an object of the present invention, therefore, to provide means for mounting a flexible printing member of sheet configuration on the drum of a rotary printing machine in such a way that axial and rocking adjustments of both ends can be simultaneously effected by a simple control arrangement.

It is another object of the invention to provide an arrangement such that a printing member can be angularly adjusted and tensioned in a simple manner and without requiring unusual skill on the part of the operator.

Another object of the invention is the provision of skewness and tension adjustments for a printing element on a printing cylinder wherein the means for effecting

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such adjustments are so related that the tension adjustment of the printing element can be made without seriously affecting a preliminary skewness adjustment, whereby progressive refinement of the latter based on test samples can be readily achieved.

Another object of the invention is the provision of equipment satisfying any or all of the foregoing objects and so arranged that it can be installed as a unit in the clamp recess of standard printing cylinders without significant modification thereof.

A further object of the invention is the provision of the means set out in the foregoing objects in a relatively uncomplicated and inexpensive fashion suited for application with relation to many types of printing machines and duplicators.

These objects are achieved according to the invention by providing an anchor assembly which embodies individual anchor means for each end of the flexible printing member, but in which the anchor means have a direct mechanical relationship. This relationship consists in mounting both anchor means on a single rockable carriage. The anchor means are slidable relative to each other lengthwise of the carriage (transversely of the printing drum) by a single adjusting control, while the carriage is free to rock and accommodate itself to the angular position assumed by the printing member in response to the shifting adjustment of the anchor means.

Tensioning means are also provided for drawing the anchor means (after angular adjustment is completed) toward each other to draw the printing member into taut condition about the drum. The rockable mounting of the carriage also remains effective during this operation to help equalize any local tension deviations which may develop during tensioning of the printing element.

Additional objects, features and advantages will appear hereinafter as the description proceeds.

In the drawing:

FIG. 1 is a side elevation of a printing drum embodying the holding and adjusting means of the present invention, and showing a printing plate mounted thereon with the parts adjusted to skew the printing plate in one direction;

FIG. 2 is an end view of the device of FIG. 1 taken from the right-hand end as seen in FIG. 1;

FIG. 3 is a detail bottom plan of the anchor assembly removed from the drum, and with a portion of the assembly omitted for purposes of clarity, the view being taken substantially on line 3-3 of FIG. 1, and with the parts adjusted to substantially central unskewed position;

FIG. 4 is a detail section taken substantially on line 4-4 of FIG. 1; and

FIG. 5 is a detail elevation taken substantially on line 5-5 of FIG. 4.

Referring to the drawing which illustrates a preferred embodiment of the invention, there is shown a rotary printing element 11, in this case the plate cylinder of a planographic printing press. The cylindrical surface 13 of the drum is adapted for the reception of a flexible printing member or plate 15 and is locally interrupted by an axially extending recess 17, as is customary, for receiving suitable means for anchoring the ends of the plate 15 and tensioning the plate about the cylinder.

Within the recess 17 is mounted the anchoring and adjusting means 19 (FIG. 3) of the present invention which includes a foundation plate 21 and an anchor assembly 23 mounted thereon for limited rocking movement. The foundation 21 is a bent plate one leg of which is secured to a substantially radial face of the drum recess 17 by screws 25. The other leg extends transversely and supports the anchor assembly 23, as seen in FIG. 4. It is provided centrally with a threaded boss 27 which receives a mounting and pivot screw 29. Screw 29 has a

stop shoulder and bearing section 31 which rockingly receives a complementary opening 33 in the central portion of an elongate carriage 35.

For convenience in assembly and disassembly, the screw 29 is preferably arranged in trapped relation to the carriage 35 by a guard plate 37 secured to the carriage by screws 39, 39 and having an aperture 41 for admitting a screwdriver into operative relation with the head of screw 29.

The carriage 35, as seen in FIG. 3, is essentially a U-shaped plate having opposed end members 43, 43 with outwardly bent longitudinally extending tabs 45, 45. Secured to these tabs as by screws 47 is one plate anchoring element 49, shown as a pin-bar, although other plate attaching means may be substituted as will be readily appreciated. Plate anchoring element 49 is best seen in FIGS. 1 and 2, since it has been omitted for clarity in FIG. 3.

While anchoring element 49 is rigidly secured to the carriage 35 in the manner just described, another plate anchoring and tensioning element 51 is mounted on the carriage for restricted shifting and pivoting movement. This is accomplished in part by means of a rock shaft 53 extending from end to end of the carriage 35 and journaled in suitable openings in the opposed end members 43, 43 in such a way that endwise shifting of the shaft is prevented. A U-shaped bracket 55 has perforate ears 57, 57 slidably received on the rock shaft 53. The bracket is rigidly secured to anchoring element 51 by screws 59, 59. There is also provided a central guide block 61 slidable on the shaft 53 and secured to the bracket 55 and anchoring element 51 by screws 63, 63. As can be seen, the assembly consisting of bracket 55, guide block 61 and anchoring element 51 can be shifted lengthwise a short distance since the ears 57 are spaced somewhat inside the end members 43.

A control member is provided for adjusting the lengthwise shift of anchoring element 51, in the form of a combined hand-wheel and cam 65 which rotates on a central screw 67 affixed to a support 69 anchored to shaft 53, as by set screws 71. The wheel 65 is constructed with a spiral slot 73 which receives a screw 75 projecting from the guide block 61, and acts upon the latter to shift the assembly 55, 61, 51 back and forth as the hand-wheel is turned. Screws 67 and 75 are both preferably of the shoulder type to avoid the possibility of clamping the wheel 65. Wheel 65 also preferably carries indicia calibrated to show the amount of endwise shift which is effected for a given angle of wheel movement. In the form shown, the wheel has peripheral notches 79 each indicating $\frac{1}{64}$ inch of travel by the anchoring element 51. These may be supplemented by smaller peripheral serrations showing movements of a smaller order as indicated at 81 in FIGS. 1 and 2. A square notch is shown at 83 in FIG. 3 which may serve to indicate the normal centralized position of the anchoring element 51. Cooperating with the indicia 79, 81, 83 is a pointer 85 which is suitably anchored in a nonrotatable fashion to the screw 67. The wheel 65 should be large enough for effective manipulation, and to provide for adequate size, the carriage 35 is apertured as indicated at 86 to allow the wheel to pass therethrough. A similar registering aperture 86' in the foundation 21 is also provided.

The bracket 55 and the anchoring element 51 are urged to swing about the axis of shaft 53 towards the anchoring element 49. This tendency is effected by springs 87, 87 which are connected at one end with pierced ears 89, 89 on bracket 55 and at the other with a flange 91 on the remote margin of carriage 35. The action of these springs is, thus, in a plate tensioning direction. It is however rather light and may not furnish the plate with operative running tension, but at least serves to hold a plate snugly on the cylinder while an adjustment is being made and prevent the possibility of its inadvertently becoming dis-

engaged from the anchoring elements during manipulation. It also serves to keep the anchoring elements in an approximation of their final degree of proximity during all skew setting adjustments so that the accuracy of the final setting will be relatively accurate and provide evenly distributed tension throughout the plate. In certain cases, as with paper plates or masters, the biasing of springs 87 may be sufficient to provide tension for running of the plate.

Final tensioning of the plate may be brought about by additional urging means in the form of a thrust screw 93 operated by a knurled head or wheel 95. The screw is threadedly engaged in the anchoring element 51 and its tip is arranged to strike the foundation plate 21 as best seen in FIG. 2. When the screw 93 is advanced it draws the anchoring element 51 downwardly as seen in FIG. 2 (towards anchoring element 49) to thereby tighten the plate 15 about the periphery of the cylinder 11. When it is retracted the tip draws away from the foundation 21 to provide room for swinging the anchor element 51 upwardly away from element 49 against the force of springs 87 for releasing and removing plate 15 or applying a new one. If the screw 93 is backed off sufficiently, the head 95 thereof can also be used to spread anchoring elements 49, 51 and hold them spread against the force of springs 87.

A pivot and spacer element 97 (FIGS. 1 and 2) is provided centrally of the exterior surface of anchoring element 49. This may be any sort of projecting abutment of small dimension lengthwise of the anchoring element. Thrusts of considerable magnitude can be applied by means of the screw 93 in tensioning a plate 15, so that the anchoring assembly 23 would require extremely heavy cross sections to prevent twisting and distortion. However these cross sections would add weight objectionable insofar as the balance and operation of the machine otherwise are concerned. It can be seen that if anchoring element 49 were in a skewed position, and if the pull applied by screw 93 were allowed to deflect anchoring element 49 outwardly sufficiently, its near end might come into contact with the wall of cylinder recess 17. If this were to happen, its self-adjusting and tension equalizing function would be impaired and the plate 15 would commence to develop unequal tensions and hence would not perform properly. The pivot 97 allows the tension of the plate 15 to apply all of its thrust to the wall of recess 17 virtually at a single point centrally of the anchoring element 49 whereby the latter is free to rock about this point to the full extent designed and to accommodate itself to the degree of skew resulting from the adjustment. In the form shown, the pivot and spacer 97 is a screw threadedly associated with the anchoring element 49 to provide for adjusting the pivot to the exact degree of extension required when the plate anchoring and adjusting means 19 is mounted in the cylinder 11. In this way all play can be taken up so that the thrust introduced by the tensioning operation will produce no deflection of the parts whatever, and the clearance available in recess 17 will be available for skewing motion of the assembly 23 about mounting and pivot screw 29.

In operation, assuming the drum 11 to be unloaded and awaiting the application of a plate, the wheel 95 will be turned to back off screw 93 and permit swinging of the anchoring element 51 away from element 49. The imaged plate 15 is then wrapped around the cylinder and its end portions engaged with the anchoring elements. (In this case the plate perforations are slipped over the matching pins shown as provided therefor.) Assuming that the image appears to be approximately correctly placed on the plate, the wheel 65 is set in central adjustment position with notch 83 adjacent pointer 85 as seen in FIG. 3. This places the plate 15 straight on the drum 11, with the anchoring elements 49 and 51 directly opposite each other. Screw 93 is then turned in a clockwise direction

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to project it against the foundation 21 and thereby tension the plate 15 about cylinder 11, assuming that a metal plate is being mounted. One or more test copies can then be run off and inspected for accuracy of placement of the image on the paper. If any degree of skewness appears this can be readily corrected by the following procedure.

First the edge of the image on the paper is projected to locations representing the plate ends, and the difference in spacing from the paper edge at these locations is found. This gives the approximate shift required in inches. The screw 93 (if it has been tightened) is backed off somewhat to relax the plate tension, and wheel 65 is rotated in the proper direction to a mark 79 indicating the value of shift computed as necessary to correct the skewness of the image. This displaces the anchoring element 51 endwise to a new position, tending to give the plate 15 a compensating skewed position on the cylinder 11 so that the image will be straightened. Such a skewed position of the plate 15 is illustrated in FIG. 1. At the same time that this occurs, the anchor assembly 23 as a whole rocks slightly about its pivot 29 so that the anchor elements are in a position to exert uniform pressure all along each edge of the plate 15. Finally the screw 93 is again projected and the plate properly tensioned if necessary.

It will be seen that additional test copies can be run off, and if the adjustment is not found to be exact, a further adjustment can be effected by repeating the steps recited immediately above including making a further setting of the wheel 65 estimated on the basis of the error detected. This can be repeated as many times as necessary with a virtually assured refinement at each setting, because relaxing of the tension applying screw 93 does not disturb the previous skewness setting. After the final setting is completed, taking up on screw 93 re-applies a firm evenly distributed tension on the plate without disturbing the refined skewness setting of wheel 65.

While the anchoring means of the invention is primarily designed for holding the image carrying plate in a rotary printing press, it will be understood that other applications may profitably be made of the invention as a whole or of portions thereof for securing sheets to cylindrical drums for a variety of purposes. For example, the blanket of a blanket holding drum can be similarly attached in order to make the same seat in a smooth manner with little difficulty. In such an application the anchoring elements would not usually need to be longitudinally adjustable, so that the provision for this movement and the control wheel 65 could be dispensed with.

From the foregoing description it can be seen that the present invention provides an improved means for quickly adjusting the angular position of a printing element on a printing cylinder in a simple and straightforward manner, and in a way which not only provides relatively uniform tension application each time, but does so without seriously increasing the complexity and cost of the equipment.

I claim:

1. Means for attaching a sheet to the periphery of a rotary printing cylinder comprising a carriage; means

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rockably mounting said carriage on the cylinder; a first anchoring element rigidly mounted on the carriage; a second anchoring element; means mounting said second anchoring element on the carriage for shifting movement lengthwise of and parallel to the first element, and for lateral movement towards and away from said first element; and a manually actuable means acting on said second element to shift the same lengthwise relative to said first element.

2. Attaching means as set out in claim 1 in which the carriage mounting means comprises a foundation plate adapted for readily attachable and detachable connection with the printing cylinder, and in which the carriage is rockably mounted on said foundation plate.

3. Attaching means as set out in claim 2 which includes means for urging said elements towards each other to tension the sheet about the cylinder, said urging means comprising a screw associated with said second element and said foundation plate and acting against the central portions thereof to move the second element towards the first element, and spring means acting between said second element and a spaced portion of said carriage.

4. Attaching means as set out in claim 1 which includes means for urging said elements towards each other to tension the sheet about the cylinder.

5. Attaching means as set out in claim 4 in which said urging means includes a spring.

6. Attaching means as set out in claim 4 in which said urging means includes a screw associated with said second element and acting against the central portion thereof to move the second element towards said first element to tension the sheet.

7. Attaching means as set out in claim 6 in which said urging means also includes a spring.

8. Means for attaching a sheet to the periphery of a rotary printing cylinder comprising a first anchoring element; a second anchoring element; means for mounting the second anchoring element for movement parallel to and longitudinally with respect to the first anchoring element; a combined hand-wheel and spiral cam accessible for direct manual actuation rotatable on an axis fixed with respect to said first element as regards motion longitudinally of the cylinder, said axis extending substantially normal to a radial plane of said cylinder; and means on said second anchoring element coacting with said cam for effecting shifting of the latter when the cam is manually rotated.

9. Attaching means as set forth in claim 8 which includes an index fixed non-rotatably adjacent said cam, and in which said cam includes indicia cooperable with said index to show the degree of skewness attained.

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