May 7, 1963 W. B. RAYBUCK 3,088,731

FOLDER FOR WEB-FED PRINTING PRESSES

Filed Feb. 2, 1962 3 Sheets-Sheet 1

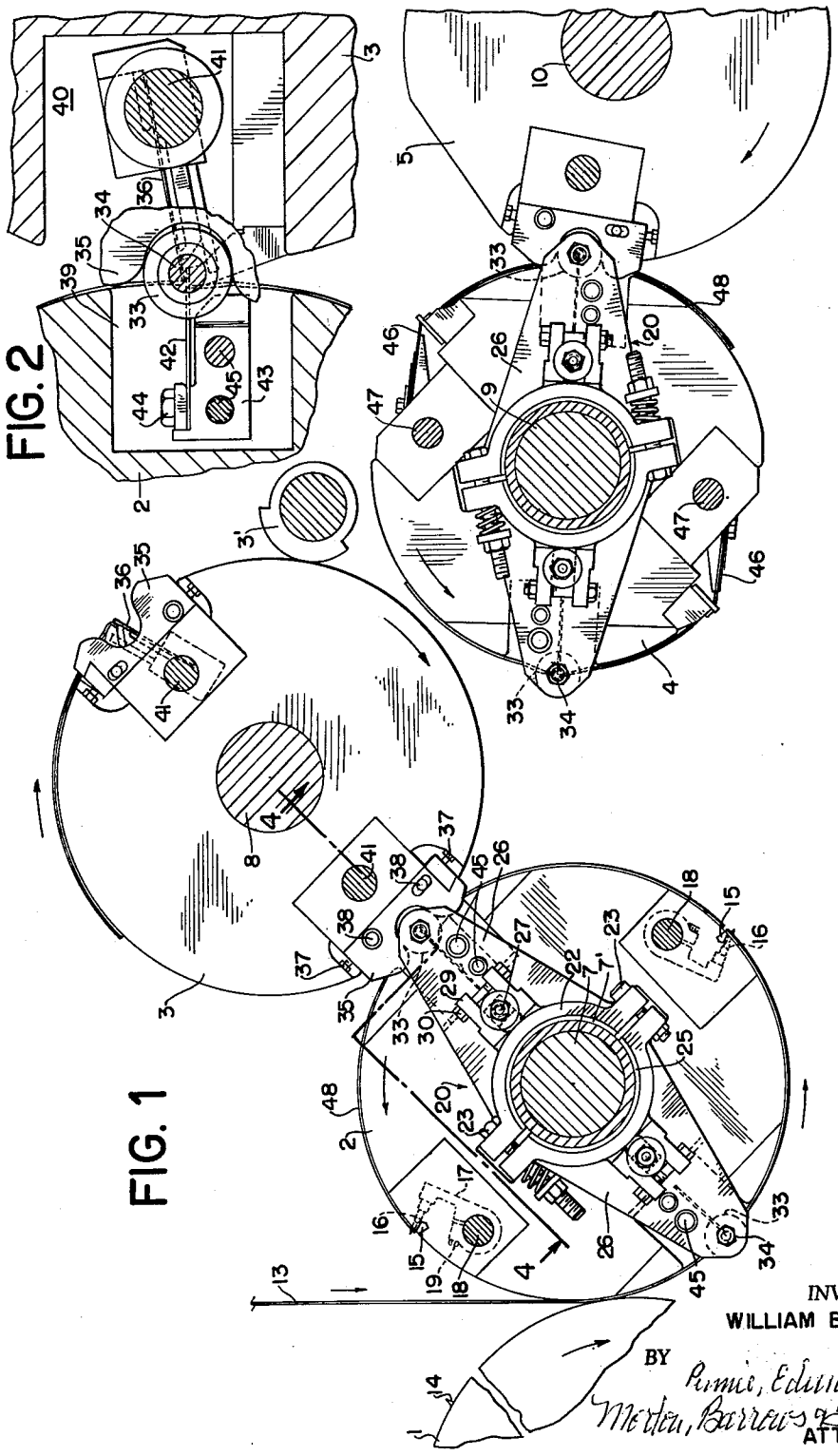


FIG. 2

FIG. 1

INVENTOR.
WILLIAM B. RAYBUCK

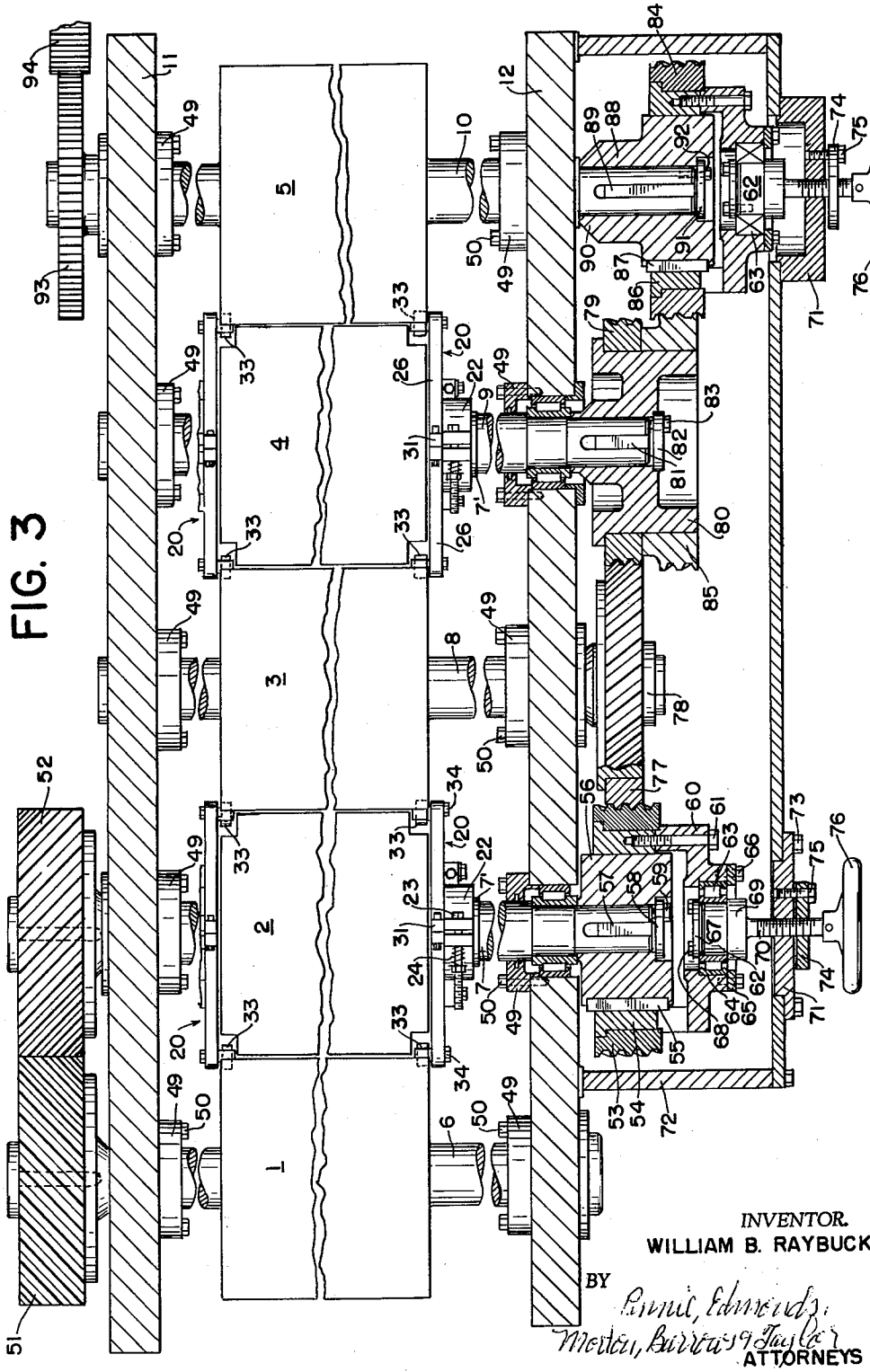
BY Pennie, Edmonds, Morton, Barrows & Taylor
ATTORNEYS

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FIG. 3



INVENTOR.
WILLIAM B. RAYBUCK

BY Pennie, Edmonds, Morton, Barrows & Taylor
ATTORNEYS

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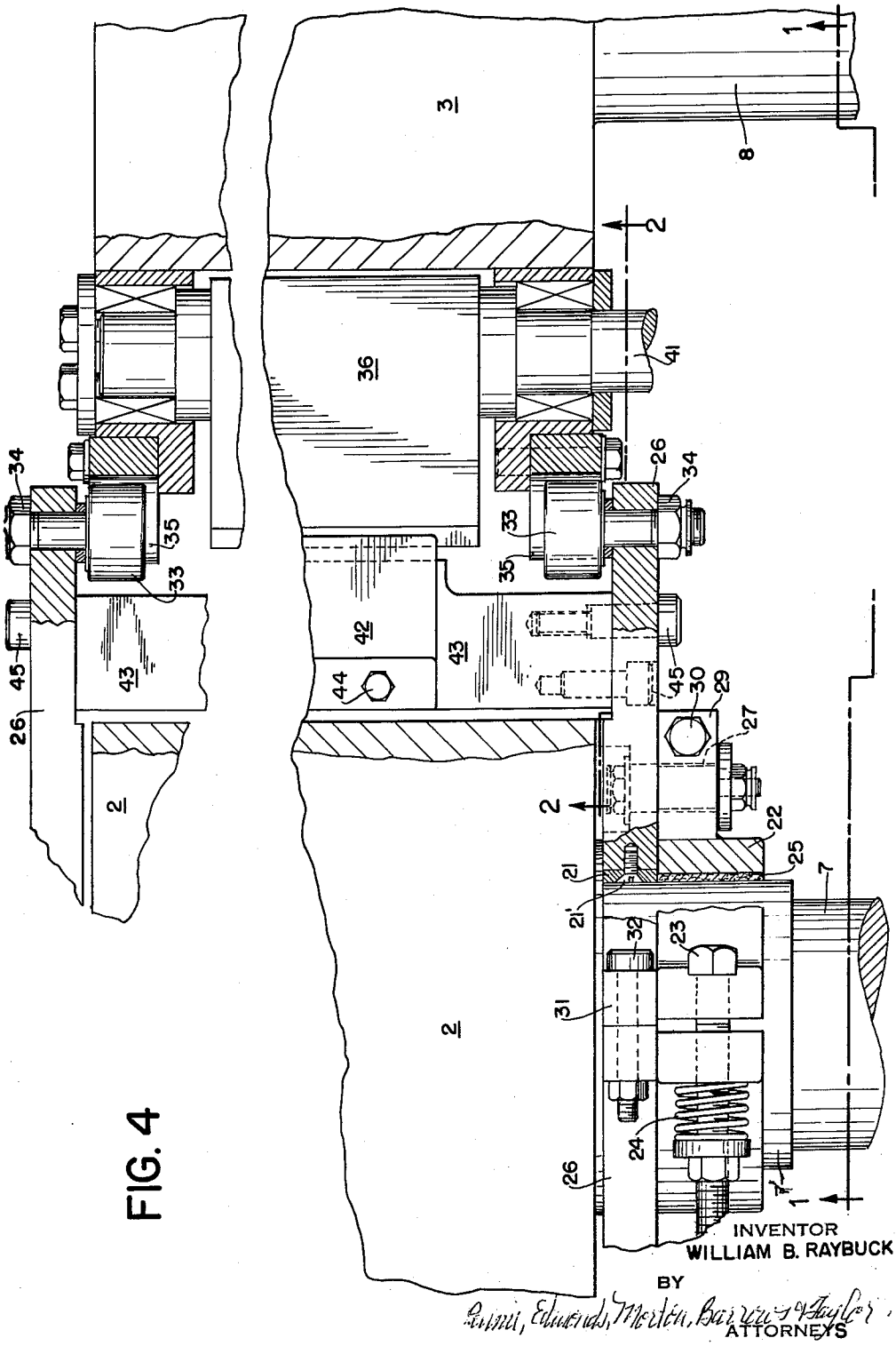


FIG. 4

INVENTOR
WILLIAM B. RAYBUCK

BY

Quirk, Edwards, Morton, Bair, Vitz & Taylor
ATTORNEYS

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FOLDER FOR WEB-FED PRINTING PRESSES

William B. Raybuck, Lansdowne, Pa., assignor to Fred'k H. Levey Company, Inc., New York, N.Y., a corporation of New York

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5 Claims. (Cl. 270—72)

This invention relates to improvements in folders for use in conjunction with printing presses and relates more particularly to folders of the type adapted to make one or more folds in printed sheets or signatures passing from the printing press.

The invention is of particular utility in conjunction with a web-fed printing press from which a single printed ribbon or an assembly of printed ribbons is continuously passed through a cutter, by which the ribbon is cut into sheets of predetermined length. The leading edges of the cut sheets, or signatures, are impaled on pins of a tucking cylinder and, while being carried about the cylinder, are folded by tucking the sheets, at a predetermined intermediate point, into the jaws of a cooperating jaw cylinder, the jaws closing on the fold of the tucked signature and carrying it about the jaw cylinder to a collection mechanism or, if desired, to further cooperating tucking and jaw cylinders for effecting further folds.

In accordance with conventional practice, as previously indicated, the printed web, or usually an assembly of printed ribbons, passes from the press and is cut into signatures and the signatures folded over either once or a number of times, for instance, into page sizes suitable for binding.

It is, of course, necessary that the folds be properly placed, for instance, so that the respective page edges or margins coincide. Also, it is sometimes desirable to position one or more of the folds so that the edge of one or more sheets extends somewhat beyond the edges of the other sheets of the signature. In other words, the signatures may be folded evenly or with an overlap.

Heretofore, the positioning and adjustment of the folds have been accomplished only by extensive adjustment of the folder mechanism and has required a complicated and expensive construction and design in order to permit the necessary adjustments.

It is an object of my present invention to provide a simple, inexpensive and conveniently operable, yet dependable and accurate method and means for accomplishing the adjustment of the folds without interrupting press operation. A further object is to provide a method and means whereby such adjustment or desired change in the position of any one fold may be made at will without disturbing the positioning of the other folds in the signature.

These objects are attained by my present invention, together with other advantages which will hereinafter appear.

The invention will be described and illustrated with reference to the accompanying drawings which represent a particularly advantageous embodiment thereof. However, in view of the following description, various modifications will be apparent to one skilled in the art without departing from the principle and scope of my invention.

FIG. 1 of the drawings is an elevational end view of the cylinders of a folding mechanism comprising two pairs of cooperating tucking and jaw cylinders adapted to make two folds in the respective signatures,

FIG. 2 is an enlarged fragmentary end view, partly in section, along line 2—2 of FIG. 4, showing the tucker blade and jaw and clamping arrangement,

FIG. 3 is a developed horizontal sectional view of the folder of FIG. 1 showing gearing and circumferential adjustment mechanism, and

FIG. 4 is an enlarged sectional view along the line 4—4 of FIG. 1.

In these drawings, a male cutter cylinder is shown at 1, a first tucking cylinder at 2, a first jaw cylinder at 3, a second tucking cylinder at 4 and a second jaw cylinder at 5. These respective cylinders are mounted on coaxially-extending shafts 6, 7, 8, 9 and 10 supported by side-frames 11 and 12. There is also disclosed, diagrammatically, an adjustably mounted timed roller 3' adapted to cooperate with the first jaw cylinder to hold the signatures while they are being transferred from the jaws to the grippers of the second tucking cylinder, as well understood in the art.

Referring more particularly to FIGS. 1 and 2, the assembled ribbons 13 are cut into lengths in passing between cylinders 1 and 2 by the knife indicated at 14 on cylinder 1 and the female cutting member indicated at 15 on cylinder 2. Immediately preceding the cut, the leading edge of the assembly of ribbons is impaled on pins 16 adapted to be extended beyond the periphery of cylinder 2 and retracted automatically, as well understood in this art.

It will be understood that the cutting, impaling, gripping, jaw clamping and timed roller mechanisms herein described may be of conventional design and constitute no part of the present invention. Such mechanisms and their operation are well-known in the art and need not here be described in detail.

In the drawing, pins 16 are shown as supported by arm 17, clamped at its inner end about shaft 18 by means of screw 19, shaft 18 being automatically rotated at controlled intervals to extend or retract the impaling pins.

Attached to each of the shafts 7 and 9, at each end of cylinders 2 and 4, is a spider represented at 20, on which is mounted a split bronze bushing 21 secured to the spider, as by means of flat-headed screws 21', and which rides with a running fit on a hardened steel sleeve 7' which is shrunk onto shaft 7. The spider is also provided with a split hub 22 within which there is provided an asbestos brake lining 25 and which is adapted to be tightened on the shaft by means of bolts 23, at least one of said bolts being provided with a tension spring 24.

The spider as shown comprises two opposite radially-extending arms 26 adjustably secured to the hub 22 by means of stud 27 which is provided with a square portion which fits into the slots of the split hub between the tension arms 29 and is clamped therein by bolt 30 so as to permit adjustment should wearing of the asbestos occur. This stud 27 is also provided with a rounded portion which extends through the arm 26 thus permitting radial adjustment of the arm while providing means for securing the arm to the hub. As more clearly shown in FIG. 4, the split bronze bushing is clamped about the shaft by means of extending lugs 31 and bolts 32.

At the outer end of each arm 26, there is provided a cam roller 33 rotatably attached to the arm by means of nut 34, said cam roller being adapted to cooperate with a spread-U-shaped cam member 35 positioned at each end of the jaw cylinder 5 symmetrically with respect to the clamping jaws 36 thereof. The cam members 35 are adapted to be nicely adjusted with respect to the jaws 36 by means of adjustment screws 37, and are adjustably secured to the end of the cylinder as by means of machine screws indicated at 38.

In the apparatus represented by the drawings, two clamping jaws are positioned diametrically opposite each other and it will, of course, be understood that they extend the entire length of the cylinder, as do also the cooperating tucking blades, in accordance with conventional practice. However, the invention also contemplates the use of a single jaw or a number of jaws in excess of two.

As more clearly shown in FIG. 2, in order to accommo-

date the tucking blades and permit their circumferential adjustment, a portion of the periphery of cylinder 2 is cut away as indicated at 39 and similarly, to accommodate the clamping jaw and operating mechanism, a portion of the periphery of cylinder 3 is cut away as indicated at 40. The jaw mechanisms are rigidly supported by the respective cylinders 3 and 5 and actuated as by means of a shaft indicated at 41, in accordance with conventional practice.

The cooperating tucker blades 42 are secured to blocks 43, each extending longitudinally over the entire length of the cylinder, the tucker blades being attached to the block at intervals as by means of bolts 44.

Block 43 is supported at each of its ends by one of the arms 26 of the previously-described spider and is secured thereto by means of bolts 45.

In the mechanism described, the position of cam roller 33 and tucker blade 42 may be adjusted radially to obtain optimum cooperation with the jaw by loosening studs 27 and bolts 30 and adjusting the position of the stud.

The cylinder 4, and the tucker blade arrangement associated therewith, may be substantially identical with the previously-described cylinders 2 except that no cutting block is provided and that conventional grippers, indicated at 46 supported by a shaft 47, are substituted for the impaling pins of cylinder 2. The tucking blades and tucking jaws of cylinders 4 and 5, respectively, may be identical with those previously described and like parts will be indicated by like reference numerals.

By reason of the frictional contact between the rotating shaft of the tucking cylinder and the spider, in normal operation the spider will rotate with the cylinder and the cam roller 33 will center in the cam element 35. However, if cylinder 3 be moved circumferentially in small increments relative to cylinder 2, the cam roller 33, on approaching cam 35 and contacting a sloping edge thereof, will be mechanically forced circumferentially in a corresponding direction with respect to cylinders 2 so as to center in the cam element 35.

The spider, which carries the tucker blade, is thus correspondingly moved and the coincidence of the tucker blade and the jaw thus maintained. Since the signature indicated at 48, for instance, being carried about the tucking cylinder, maintains its position with respect to the cylinders, the relative movement of the tucking blade and the corresponding jaw with respect thereto changes the position of the fold with respect to the leading edge of the signature.

A further element of the present invention consists of method and means for effecting the circumferential movement of the jaw cylinder with respect to the tucking cylinder, which is more clearly illustrated by FIG. 3 of the drawings.

The respective cylinders are rotatably supported at their opposite ends by side-frames 11 and 12 through their respective shafts and appropriate bearings indicated at 49 secured to the side-frames as by means of bolts 50. The respective shafts are also secured by conventional means against longitudinal movement.

Keyed to shaft 6 of cylinder 1 is helical gear 51 driven by suitable means, for instance the printing press main drive shaft. Cooperating helical gear 52 is keyed to shaft 7 of the first tucking cylinder and is driven by helical gear 51. Slidably keyed to the opposite end of shaft 7 is a helical gear 53, the gear being secured to sleeve 54 which, in turn, is slidably keyed at 55 to sleeve 56. Sleeve 56 is keyed to shaft 7 at 57 and is secured against longitudinal movement with respect thereto by plate 58 attached to the end of the shaft as by means of machine screws 59.

Bracket 60 is secured to sleeve 54 by means of machine screws 61. Shaft 62, which is coaxially positioned with respect to shaft 7, is rotatably secured to the bracket 60 by means of bearing 63 secured against longitudinal movement with respect to bracket 60 by means of shoulder 64 and bearing retaining plate 65, the latter being

secured to the bracket 60 by means of machine screws 66.

Shaft 60 is secured against longitudinal movement with respect to the bearing by means of retaining plate 67 attached to the shaft by means of machine screws 68 and outer shoulder 69.

The outer portion of shaft 62, of reduced diameter, is threaded as indicated at 70 and extends through an internally-threaded cooperating member 71 secured to housing 72, extending from side-frame 12, by means of bolts 73. An auxiliary internally-threaded member 74 is secured to member 71 by means of screws 75.

By turning shaft 62 in either direction, as by means of hand wheel 76, or otherwise, the cooperating threads force the shaft 62, and also bracket 60, sleeve 54 and helical gear 53, to move longitudinally in a corresponding direction with respect to shaft 7.

Cylinder 3 is driven through a helical gear 77 which meshes with helical gear 53 and is keyed to shaft 8 and secured against longitudinal movement with respect thereto by means of retaining ring 78. Cylinder 4 is, in turn, driven through helical gear 79 meshing with gear 77 and secured to member 80, the latter being keyed to shaft 9 at 81 and secured against longitudinal movement with respect thereto by means of retaining plate 82 and machine screws 83. Cylinder 5 is driven through helical gear 84 which meshes with helical gear 85 secured to the outer end of member 80.

Helical gear 84 is secured to collar 86 slidably keyed at 87 to sleeve 88, the latter being keyed to shaft 10 at 89 and secured against longitudinal movement with respect thereto by means of shoulder 90, retaining plate 91 and machine screws 92.

Means are provided for moving the collar 86 longitudinally with respect to shaft 10 which may be substantially identical with those previously described with respect to helical gear 53 and corresponding parts are indicated by like numerals.

Attached to the opposite end of shaft 10, there is shown a spur gear 93 keyed to the shaft and meshing with a further spur gear fragmentarily indicated at 94 for driving subsequent mechanisms if desired.

Circumferential movement of cylinder 3 with respect to cylinder 4, in either direction, may be effected through the mechanism described by turning the shaft 62 in the appropriate direction thus forcing the helical gear 53, meshing helical gear 77, to move longitudinally with respect to shaft 7. Since helical gear 77 is secured against longitudinal movement, it will be forced to move circumferentially thus effecting corresponding circumferential movement of cylinder 3. However, in effecting this adjustment of the position of the fold made by cylinders 2 and 3, the position of the fold made by cylinders 4 and 5 is not disturbed, since the circumferential position of helical gears 79, 85 and 86, relative to helical gear 77, remains unchanged.

Where it is desired to adjust or change the position of the fold made by cooperating cylinders 4 and 5, helical gear 84 is forced to move longitudinally with respect to shaft 10, as previously described, thereby causing gear 84 to move circumferentially with respect to gear 85. Since gear 85 is indirectly connected with the drive mechanism, it cannot move circumferentially relative to gear 77 and consequently the circumferential movement is confined to gear 84 thus moving cylinder 5 circumferentially relative to cylinder 4.

It will be seen, therefore, that the adjustment of either fold can be made without in any way disturbing the position of the other fold.

In view of the foregoing description and illustration of my invention, various modifications of the disclosed means for effecting circumferential adjustment of the jaw cylinder relative to the tucking cylinder and for automatically adjusting the position of the tucker blade with respect to the tucking cylinder to coincide with the jaws will be ap-

parent to one skilled in this art without departing from the spirit or scope of my invention, More particularly, it will be recognized that various modifications of the disclosed means may be used to effect circumferential adjustment of the jaw cylinder relative to the tucking cylinder, and for driving the various cylinders, as well as cam mechanism for moving the tucker blade circumferentially with respect to the tucking cylinder to coincide with the jaws of the jaw cylinder.

I claim:

1. A folder mechanism for folding signatures passing from a printing press comprising:

(*a*) a tucking cylinder and a cooperating jaw cylinder rotatably mounted on coaxially-extending parallel shafts,

(*b*) the tucking cylinder having at least one tucker blade and the jaw cylinder having a corresponding number of cooperating tucker jaws,

(*c*) a spread-U-shaped cam member symmetrically positioned with respect to, and coinciding with, each end of the jaw,

(*d*) a spider frictionally attached to the tucking cylinder shaft at each end of the tucking cylinder and adapted to rotate with said cylinder and to be forcefully moved circumferentially with respect thereto, each spider being provided with at least one radially-extending arm for supporting one end of the tucking blade and each of said arms being provided at its outer end with a cam roller adapted to cooperate with the said U-shaped cam member, and

(*e*) means for effecting circumferential adjustment of the jaw cylinder relative to the tucking cylinder and thereby causing the spider and the supported tucking blade to move accordingly relative to the tucking cylinder and effecting a change in the position of the fold in the signature.

2. The apparatus of claim 1 further characterized in that the spider is provided with two oppositely extending arms each carrying a tucker blade and that the jaw cylinder is provided with two oppositely-positioned cooperating jaws.

3. The apparatus of claim 1 further characterized by a second tucking cylinder adapted to receive the folded signatures from the jaw cylinder and a second jaw cylinder cooperating with the second tucking cylinder for effecting a second fold in the signature.

4. The apparatus of claim 1 further characterized in that the means for effecting circumferential adjustment of the jaw cylinder relative to the tucking cylinder comprises a helical gear slidably keyed to the shaft of the tucking cylinder, a cooperating helical gear rigidly keyed to the shaft of the jaw cylinder and means for forcing the first said helical gear to move longitudinally with respect to the tucking cylinder shaft thereby forcing the helical gear attached to the jaw cylinder shaft to move circumferentially.

5. The apparatus of claim 3 in which the respective cylinders are driven from the shaft of the first tucking cylinder through a series of cooperating helical gears keyed to the respective shafts, the helical gears keyed to the shafts of the first jaw cylinder and the second tucking cylinder, respectively, being secured against longitudinal movement with respect to those shafts, means for moving the helical gear keyed to the shaft of the first tucking cylinder longtiudinally with respect to said shaft and thereby effecting circumferential movement of the first jaw cylinder relative to the first tucking cylinder and means for moving the helical gear of the second jaw cylinder longitudinally with respect to the shaft of said cylinder and thereby affecting circumferential movement of the second jaw cylinder with respect to the second tucking cylinder.

No references cited.