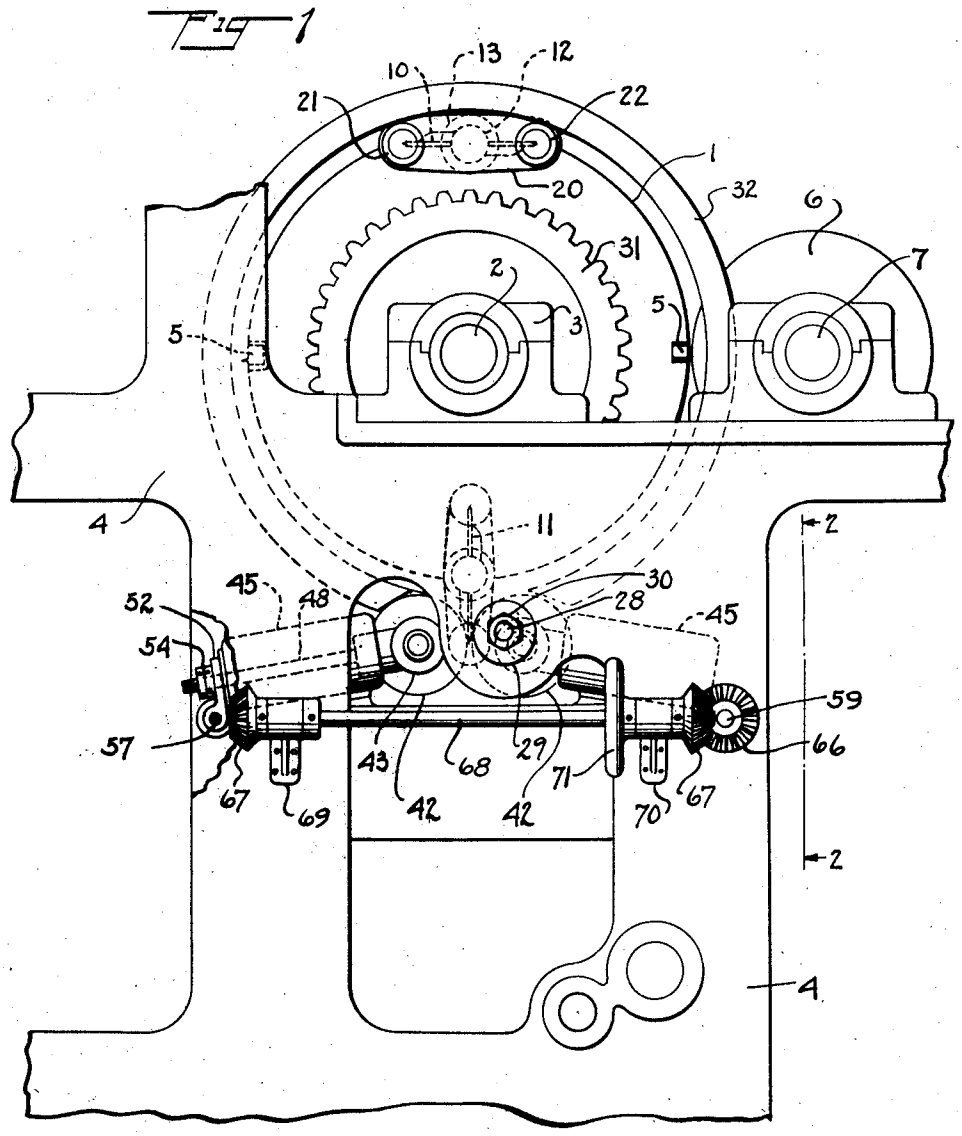
April 1, 1930. W. EVENSEN 1,752,426

FOLDING MECHANISM

Filed March 16, 1923 4 Sheets-Sheet 1

Fig. 1




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Filed March 16, 1923 4 Sheets-Sheet 2

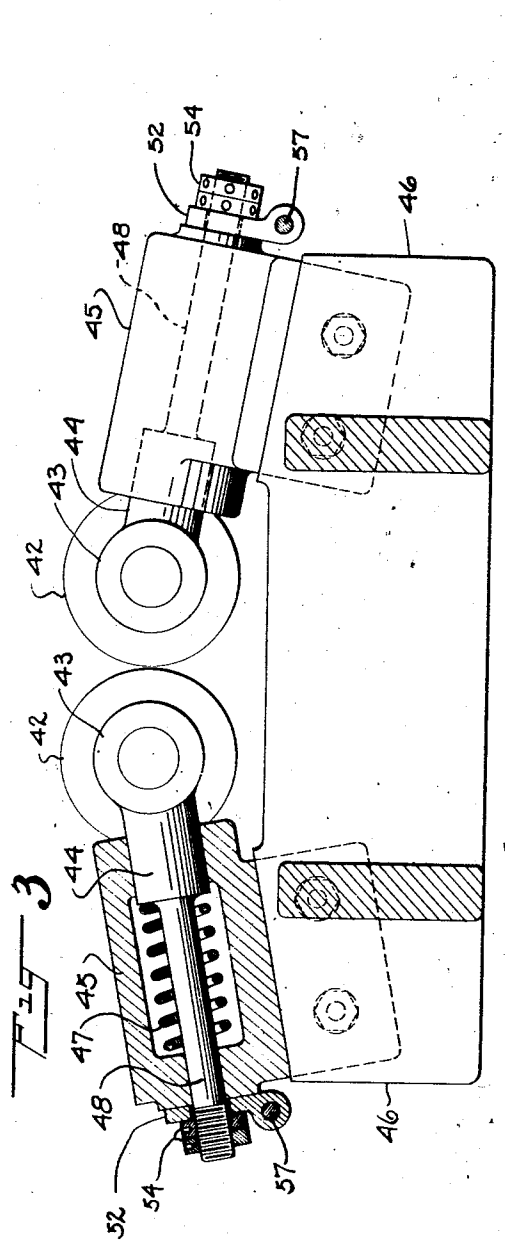


Fig. 3

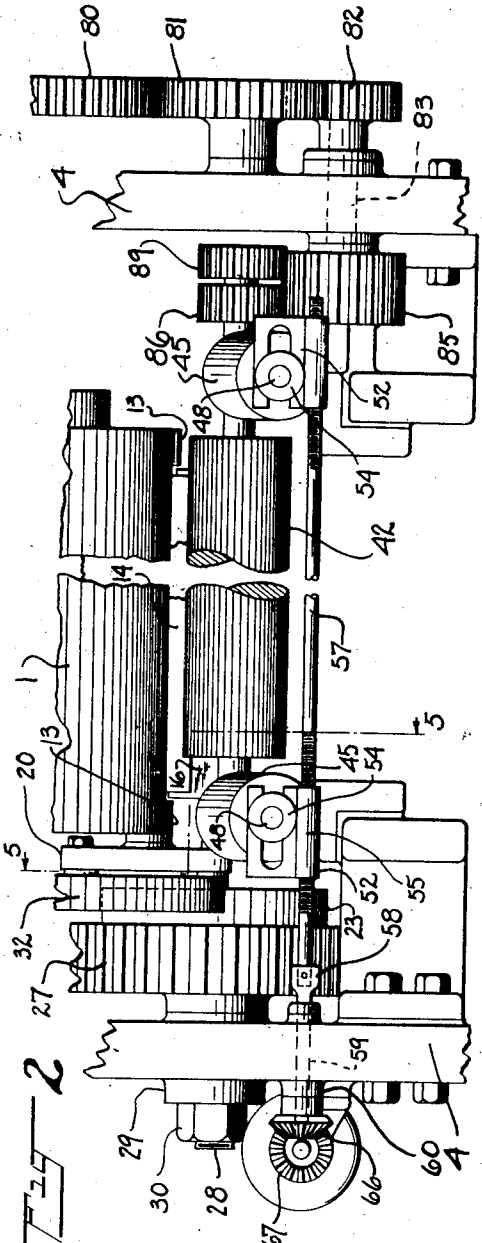


Fig. 2

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Filed March 16, 1923 4 Sheets-Sheet 3

Fig 5

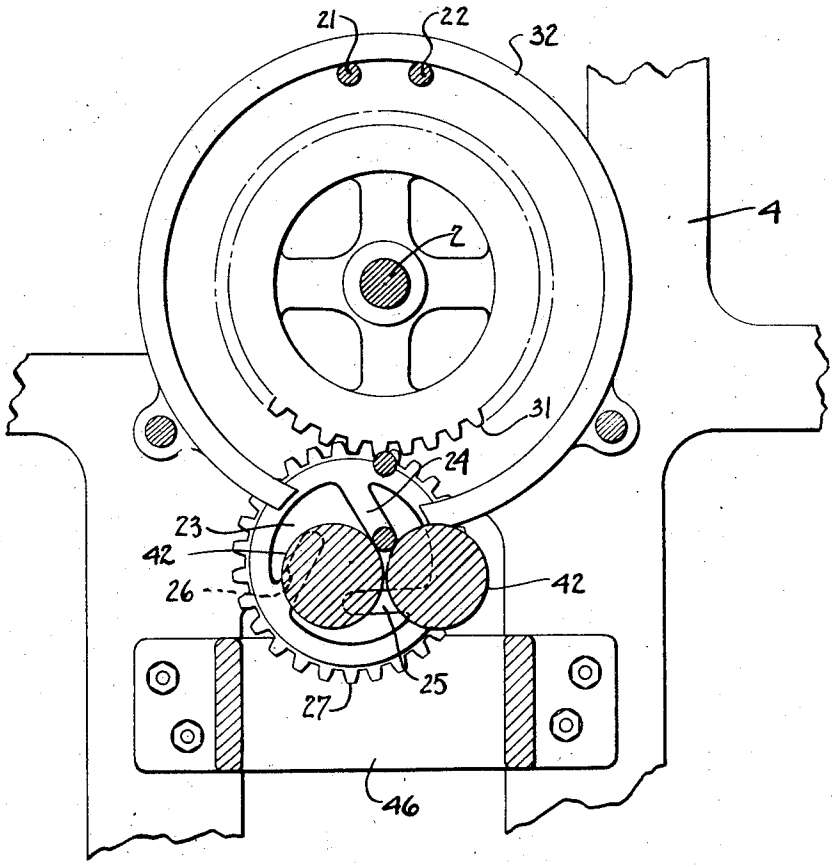
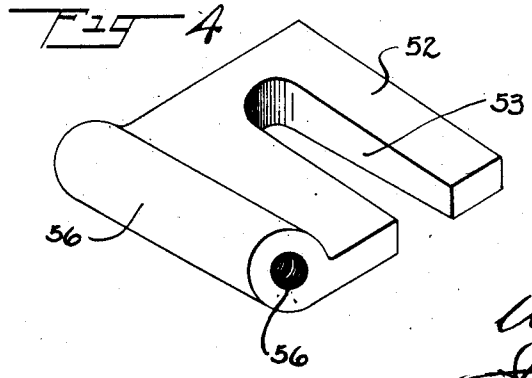



Fig 4




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FOLDING MECHANISM

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Fig 7

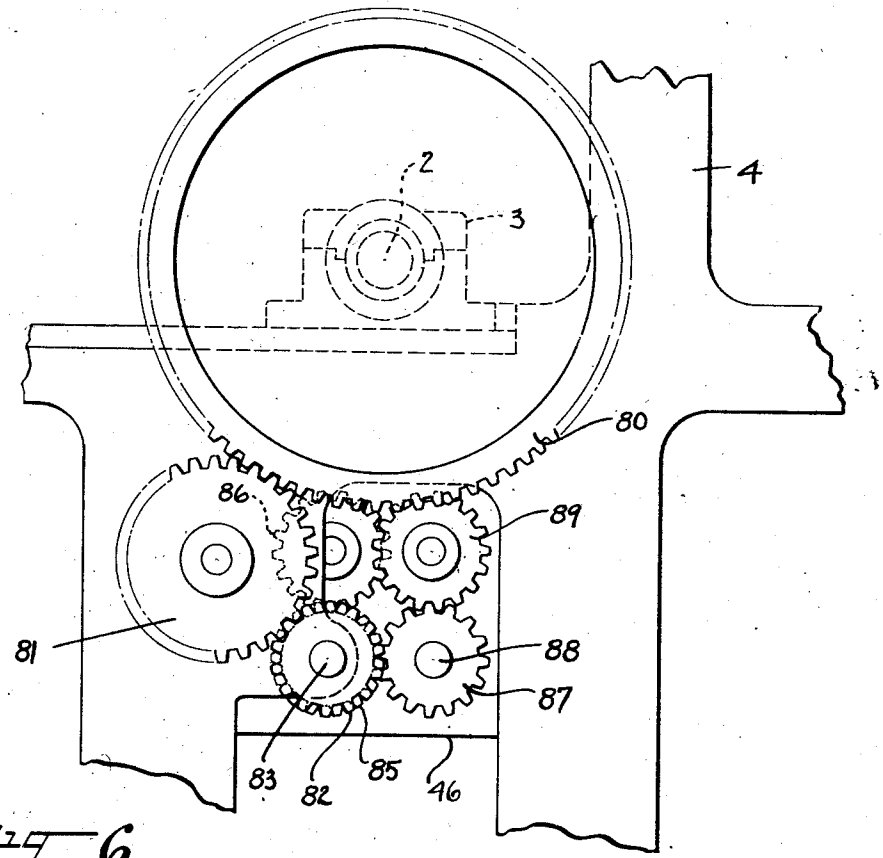
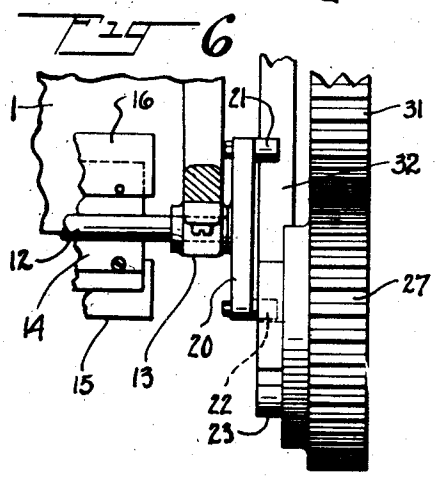



Fig 6




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Patented Apr. 1, 1930 1,752,426

# UNITED STATES PATENT OFFICE

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## FOLDING MECHANISM

Application filed March 16, 1923. Serial No. 625,577.

The invention relates to a novel and useful folding mechanism and more particularly in the exemplified application thereof to a fast rotary folding mechanism for cross-folding newspapers or like products.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Fig. 1 is a fragmentary side elevation of a rotary folding mechanism embodying the invention;

Fig. 2 is an enlarged fragmentary end elevation, with parts broken away, looking at Fig. 1 substantially on line 2—2;

Fig. 3 is an enlarged, detached, detail side elevation of the folding rollers and their mountings, and corresponds to a portion of the lower central part of Fig. 1;

Fig. 4 is an enlarged, detached detail of one of the roller-positioning slides;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary detached elevation of the folding blade actuating parts, and shows a part of the mechanism at the right-hand end of Fig. 3, looking thereat from the back; and

Fig. 7 is a side elevation, looking at Fig. 2 from the right.

The invention relates to folding mechanisms of the type wherein the sheet or sheets, or like matter to be folded is tucked between a pair of folding rollers by a tucking or folding blade, and in certain of its features it relates more especially to such a pair of folding rollers cooperating with a rotatable tucking blade mounted in a rotating cylinder or equivalent rotary folding member, although so far as concerns the broader features of the invention, the invention is applicable to non-rotary and non-traveling folding mechanisms.

The broad features of the embodied invention comprise two parallel cooperating folding rollers both laterally movable, that is, parallel to their axes, and preferably symmetrically so, to and from the place of action or operation of the folding or tucking blade. Additionally, there are connections whereby the two folding rollers may be moved simultaneously and symmetrically toward or away from the place of operation of the folding blade, the same being operable by a single controlling or actuating device. The rollers are also resiliently mounted, preferably by spring action, the spring pressure being regulable for each roller.

Other features of the invention will be primarily set forth in connection with the following detailed description, and it will be understood that both the foregoing general description and the following detailed description are explanatory and exemplary of the invention, but are not restrictive thereof.

Referring now in detail to the embodiment of the invention illustrated by way of example in the accompanying drawings, the member which carries the sheet or usually the group or bundle of sheets preparatory to folding, and from which they are folded off, comprises a cylinder 1, the shaft 2 of which is journaled in bearings 3 at either end thereof, respectively, upon the side frames 4 of the machine. Suitable means are provided for holding the group or stack of sheets upon the cylinder, which means may be of any suitable kind or form, but are shown herein conventionally as pins 5 adapted to engage with the lead end of the group or bundle of sheets. There are two such sets of pins shown, a semi-circumference apart, the cylinder being also provided with two folding blades. A cutting cylinder 6 is shown conventionally, journaled in bearings 7 on the machine frame, but it forms no part of the present invention, but may be used to cut the

sheets from the associated webs at this point, if desired.

Rotatably mounted upon the cylinder 1 are two folding or tucking blades 10 and 11, one being shown at rest and the other performing the folding operation, in Fig. 1 of the drawing. As embodied, the folding blades are double-edged, and make a half-revolution relatively to the rotating folding cylinder for each fold. A shaft 12 is journaled in bearings 13 near either end thereof, these bearings being mounted in the folding cylinder 1. Fixed to the shaft 12 is a blade-carrying body 14, extending in both directions diametrally from the shaft, and each of these parts is adapted to carry a folding blade. A folding blade 15 is mounted on one side thereof and a folding blade 16 is mounted on the other side thereof. These blades may, if desired, be interchangeable with others which are wider or narrower, or the blades may be made radially adjustable relatively to the body 14.

In the embodied form of means for actuating the folding blades to make the fold, a head or double arm 20 is fixed centrally of its length to the shaft 12. This head 20 has at either end thereof, respectively, outwardly projecting pins or rollers 21 and 22, adapted to cooperate with an actuating cam. The actuating cam comprises a circular disk 23, having a plurality of slots, shown as three in number, 24, 25 and 26, formed therein to cooperate with either the pin 21 or 22, already described. These slots are shown non-radial and more or less tangential with respect to the disk.

The cam disk 23 is preferably fixed to or integral with a gear 27, which gear is rotatably carried on a stub shaft 28, supported in a hub 29, formed on the machine frame 4, and held in position by a nut or nuts 30. The cam is rotated by the gear wheel 27, meshing with a gear wheel 31, fixed on the shaft 2 of the folding cylinder. A ring 32 is mounted on the machine frame, and the pins 21 and 22 run against this except when engaging the cam 23, thus holding the tucking blade in the inoperative position. This mechanism is substantially the same as that shown in United States Patent No. 871,038 dated November 12, 1907 to H. P. Husby.

Referring now to the embodied form of cooperating folding means, mechanism is provided for symmetrically and regularly and preferably simultaneously positioning both rollers toward and from each other, and for maintaining them always in symmetrical relation with reference to the folding place or striking line of the folding blade. That is, the rollers may be moved toward or from each other so that the distance between them will accommodate either a thin or thick bundle or group of sheets. A commercial example of this is where newspapers vary greatly in size, from day to day, or edition to edition, say from four pages to sixty-four pages. Due to the symmetrical positioning of both rollers, the folding blade will always strike exactly midway of the distance between the rollers, whatever that may be.

In this embodiment also, the rollers are preferably both provided with resilient mounting, so that the rollers may be positioned accurately and still have a desired amount of resilient action in such position. In the embodied form, one folding roller 42 is journaled at its ends, respectively, in hubs 43, which hubs have fixed thereto substantially radially-projecting rods or wrists 44. These wrists 44 are reciprocably mounted in correspondingly-shaped apertures in the inner heads or ends of hollow cylinders 45, mounted on the frame piece 46.

Projecting rearwardly from the respective wrists 44, and preferably integral therewith, are rods 48, which project through, and outwardly beyond, the rear heads or ends of the corresponding cylinders 45. Helical springs 47 encircle the respective rods 48 within cylinders 45, and are in compression between the inner ends of the wrists 44 and the inside faces of the rear ends of the cylinders 45.

The positioning means for the folding rollers comprise wedges or beveled plates 52, which are beveled increasingly horizontally and outwardly, as shown in Fig. 4. These wedges have slots 53 formed therein, which slots straddle the rods 48. The respective rods 48 have lock nuts 54 screw-threaded on the ends thereof, the wedges 52 working between the exterior faces of the rear ends of the respective cylinder 45 and the lock-nuts 54. It will be noted that the lock-nuts constitute positioning means and spring-pressure regulating means for the folding roller, cooperating with the positioning wedges 52, and may be used to determine or modify the actual position of the roller, while permitting the resilient action already described.

As embodied, the two positioning wedges 52 for the bearings at each end of the folding rollers are mounted for equal, accurate and simultaneous movement, and for this purpose each positioning wedge has a hub 55 formed thereon, the hubs having a screw-threaded aperture 56 extending longitudinally thereof. These are screw-threaded on a rod 57, which rod has at one end thereof a flexible coupling 58 with a short shaft 59 journaled in a hub 60 on the frame member 4. The slots 53 embracing the rods 48 serve to support this structure.

In the embodied form of means for simultaneously positioning both ends of both rollers, the respective shafts 59 have beveled gears 66 fixed to one of the outer ends of each shaft, which gears mesh, respectively, with beveled gears 67 and 67, fixed to either end

of a shaft 68, which shaft is journaled at 69 and 70 on the side frame 4 of the machine. A hand-wheel 71 is fixed on the shaft 68 for turning shaft 68. Any indicating or index device of any suitable or convenient form may be employed, although none is shown, such devices being old and common in the art.

In the embodied form of driving means for the folding rollers, a gear wheel 80 is fixed on shaft 2 of the folding cylinder, and meshing therewith is an intermediate gear wheel 81, journaled on a stub shaft mounted in one of the frame members 4. Meshing with the intermediate gear wheel 81 is a pinion 82, fixed on a shaft 83, which shaft is journaled in the frame 4. Fixed to the inner end of shaft 84 is a broad-face pinion 85. A gear wheel 86 is in mesh with pinion 85, and is fixed on the shaft of one of the folding rollers 42. An intermediate gear wheel 87 is mounted on a stub shaft 88, carried by the machine frame, and is in mesh with the pinion 85, and also with a gear wheel 89, which latter is fixed on the shaft of the other folding roller 42.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation and means for moving said rollers for regulating the distance between the rollers to fold papers of different thicknesses.

2. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation and means for moving both rollers to regulate the distance between the rollers to fold papers of different thicknesses.

3. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation and a common operating means for simultaneously moving both rollers to regulate the distance between the rollers to fold papers of different thicknesses.

4. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller, at each end thereof, whereby it may resiliently yield during the folding operation and means for moving said rollers for regulating the distance between the rollers to fold papers of different thicknesses.

5. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller at each end thereof whereby it may resiliently yield during the folding operation, and means for simultaneously moving both rollers in rectilinear paths to regulate the distance between the rollers to fold papers of different thicknesses.

6. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller at each end thereof whereby it may resiliently yield during the folding operation, and means for moving both rollers to regulate the distance between the rollers to fold papers of different thicknesses.

7. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation, and means including wedges for symmetrically moving both rollers to regulate the distance between the rollers to fold papers of different thicknesses.

8. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation and connections between the mountings of both rollers whereby they are moved together either toward or from each other.

9. A printing press folding mechanism including in combination a pair of cooperating folding rollers, a resilient mounting for each roller whereby it may resiliently yield during the folding operation and connections between the mountings of both rollers whereby they are moved symmetrically in rectilinear paths together either toward or from each other.

10. A printing press folding mechanism including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary actuating cam for the blade, a pair of resiliently mounted folding rollers cooperating with the blade, and means cooperating with the roller mountings for moving both rollers for varying the distance between the rollers to fold papers of different thicknesses.

11. A printing press folding mechanism including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary cam having a plurality of actuating slots for the blade, a pair of folding rollers cooperating with the blade, and means for moving the rollers in rectilinear paths toward and away from each other, thereby varying the distance between the rollers to fold papers of different thicknesses.

12. A printing press folding mechanism

including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary cam having a plurality of actuating slots for the blade, a pair of resiliently mounted folding rollers cooperating with the blade, and means for moving both rollers for varying the distance between the rollers to fold papers of different thicknesses.

13. A printing press folding mechanism including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary cam having a plurality of actuating slots for the blade and journaled in fixed relation to said rotary folding member, a pair of resiliently mounted folding rollers cooperating with the blade, and means for simultaneously moving both rollers for varying the distance between the rollers to fold papers of different thicknesses.

14. A printing press folding mechanism including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary cam having a plurality of actuating slots for the blade, a pair of folding rollers cooperating with the blade, and means cooperating with the roller mountings including wedges for moving both rollers simultaneously for varying the distance between the rollers to fold papers of different thicknesses.

15. A printing press folding mechanism including in combination a rotary folding member, a rotary tucker blade carried thereby, a rotary cam having a plurality of actuating slots for the blade and journaled in fixed relation to said rotary folding member, a pair of folding rollers cooperating with the blade, and means cooperating with the roller mountings for moving the rollers simultaneously toward and away from each other in rectilinear paths for varying the distance between the rollers to fold papers of different thicknesses.

16. A printing press folding mechanism including in combination a rotary folding member, a pair of folding rollers adjacent thereto, a tucking blade mounted on said folding member, means for rotating the tucking blade to fold a product off the folding member into the bite of the pair of folding rollers, and means for simultaneously moving both folding rollers toward or away from each other and toward or away from the folding locus of the tucking blade.

17. A printing press folding mechanism including in combination a rotary folding member, a pair of folding rollers adjacent thereto, a tucking blade mounted on said folding member, means for rotating the tucking blade to fold a product off the folding member into the bite of the pair of folding rollers, and means for symmetrically moving both folding rollers toward or away from the folding locus of the tucking blade.

18. In a printing press folder, the combination with the folding cylinder and its blade, of a pair of folding rollers independently mounted, and means for simultaneously adjusting both rollers equal distances in opposite directions.

19. In a printing press folder, the combination with the folding cylinder and its blade, of a pair of folding rollers, a gear for driving the rollers, a pair of gears fixed with respect to the two rollers for operating them, and a second pair of gears meshing with each other and each with one of the first named pair, and driven by the driving gear, whereby the folding rollers can be moved toward or from each other without interrupting or disturbing their driving means.

In testimony whereof, I have signed my name to this specification.

WILLIAM EVENSEN.