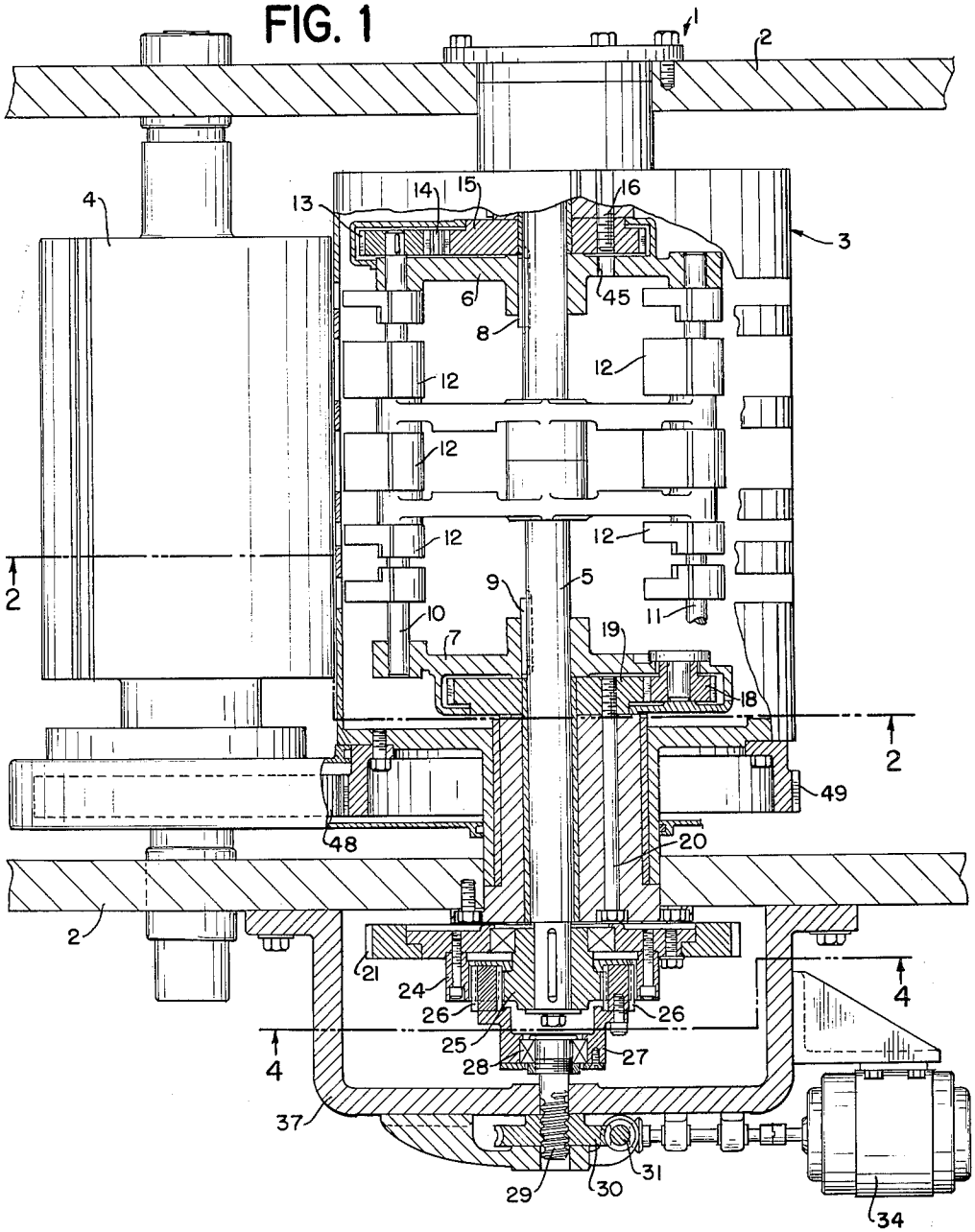
Feb. 6, 1962 E. W. WORTHINGTON ET AL 3,020,042

RUNNING FOLD ADJUSTMENT

Filed Nov. 13, 1959 3 Sheets-Sheet 1

FIG. 1



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RUNNING FOLD ADJUSTMENT

Filed Nov. 13, 1959 3 Sheets-Sheet 2

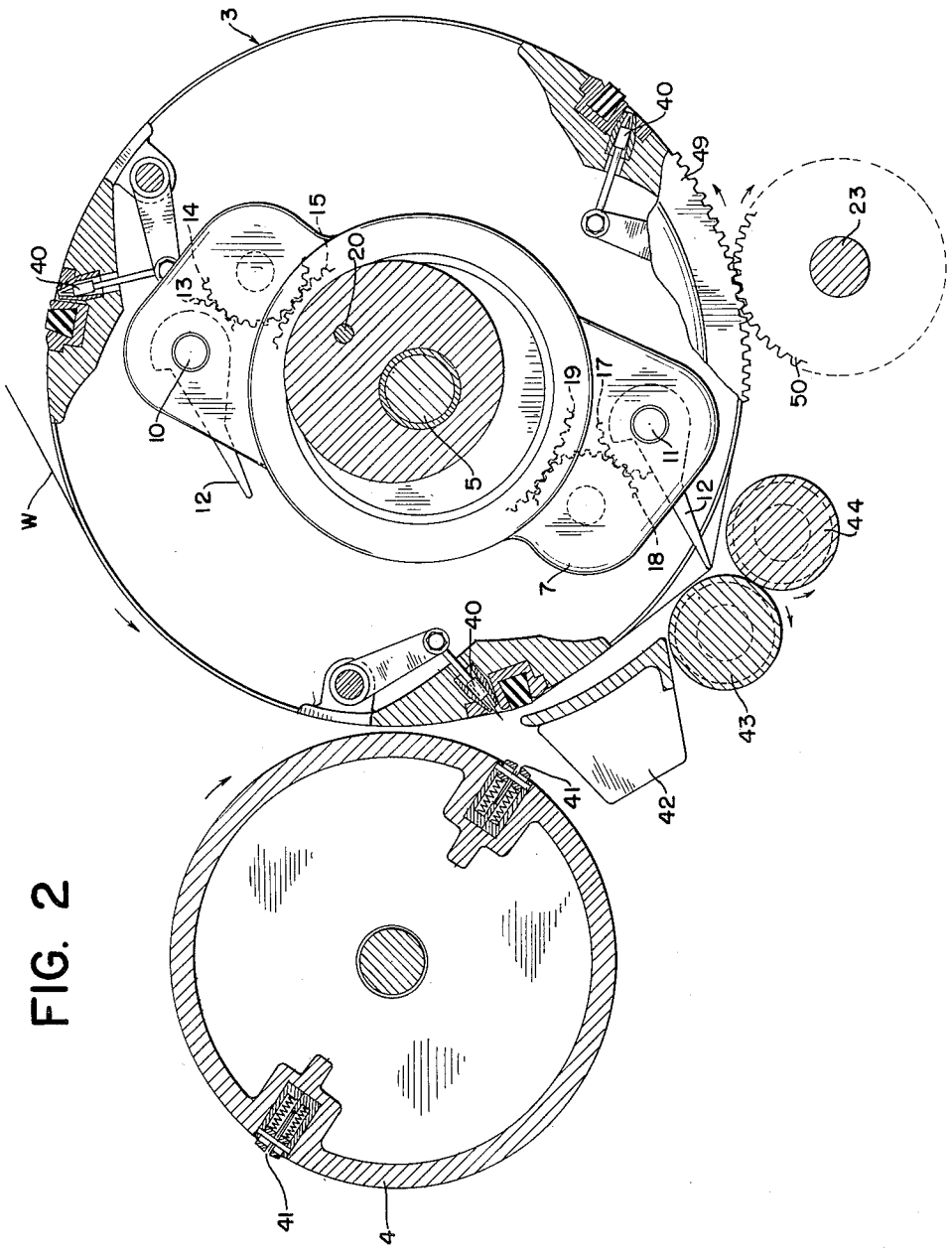


FIG. 2

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RUNNING FOLD ADJUSTMENT

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FIG. 3

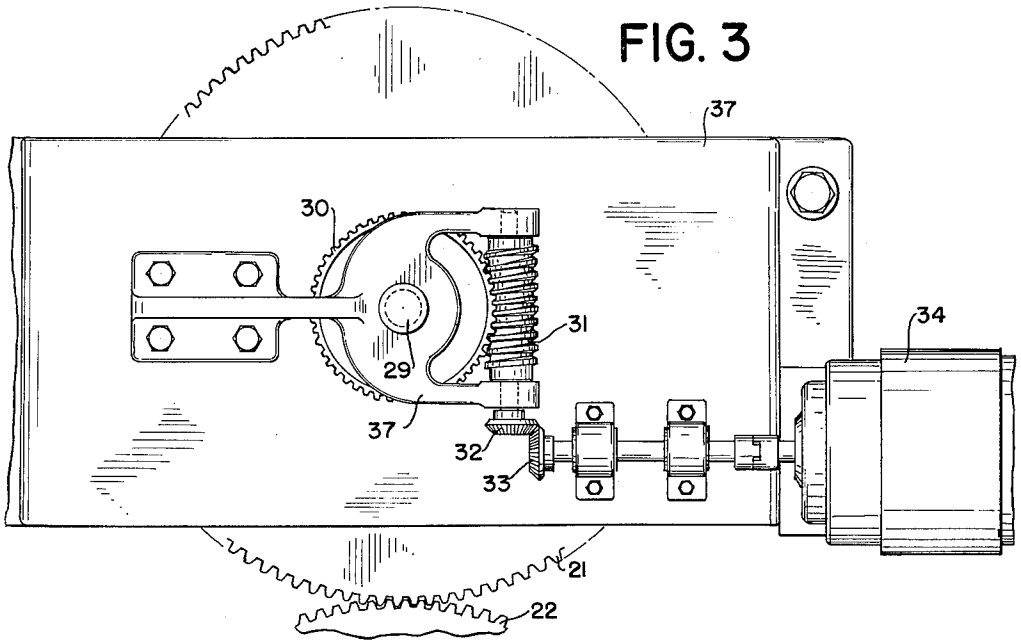
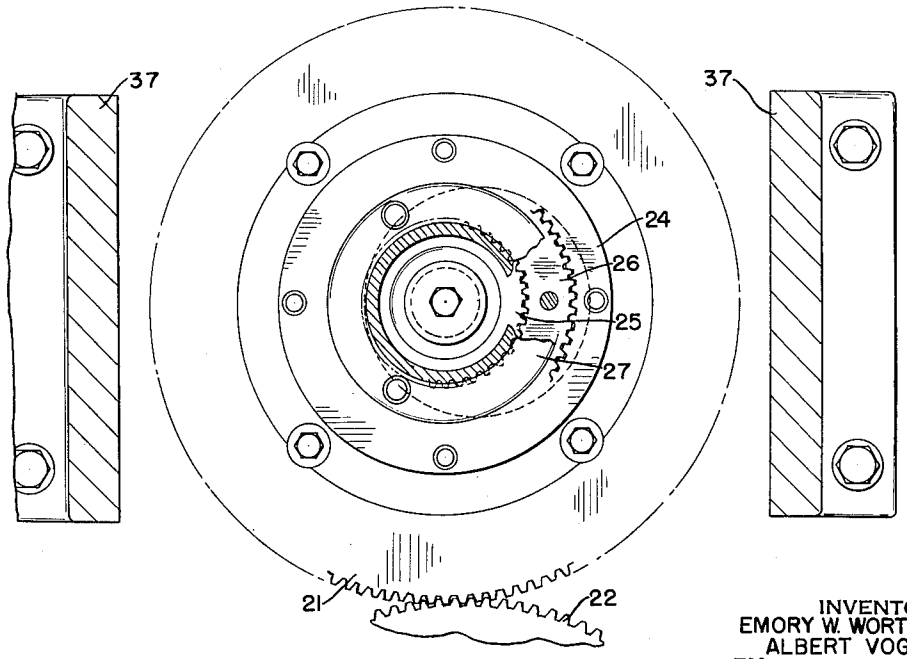


FIG. 4



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RUNNING FOLD ADJUSTMENT

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4 Claims. (Cl. 270—77)

This invention relates to a mechanism for regulating the fold in the pages of a newspaper as they pass through a folder mechanism and more particularly to a mechanism by which the fold may be regulated while the different webs of paper comprising a newspaper section continue to run through the folder.

In modern high-speed newspaper presses and in the printing of sections of newspapers which have a relatively large number of pages, for example Sunday magazine supplements, it is desirable that the fold of the pages be such that the edges of the pages after they are folded will be flush and not tapered or overlapping. There are many factors which may vary the fold and so cause the edges to overlap. One of the most important of these factors is variation in press speed and the speed of the webs emerging from the various presses printing a section as they pass into the folder mechanism. The folder blade shafts of conventional folder mechanism, particularly in the 3–2 folder mechanism are so set that the folder blades will emerge from the folder cylinder to fold sheets at a particular speed of the press as the sheets are cut from the moving webs by a cutting cylinder. Any change or variation in the speed of the webs entering the folder mechanism necessarily entails that the folder blade and the folder blade shaft to which they are attached be rotated with respect to the folder cylinder. This is so that the blades will emerge from the folder cylinder to engage the moving webs to force them into the folder rolls either sooner or later depending on whether the webs moving faster or slower than that for which the blades were previously set. This previously has been done by stopping all the presses and rotating the folder blade shaft with respect to the folder cylinder so that it will be regulated properly for the new web speed. This necessarily entailed a down time during printing with resultant increase in printing expense.

Other factors which may vary the fold and consequently the portioning of the blades to the folder cylinder are the number of pages making up a section and whether or not the newsprint has been stored in a relatively damp atmosphere which will tend to make the paper swell to a slight extent. All these are items which affect the positioning of the fold which has to be compensated for by varying the positioning of the folder blades with respect to the folder cylinder.

Broadly, we propose to overcome the aforementioned difficulties by providing a mechanism by which the folder blade shaft to which folder blades are attached may be rotated with respect to the folder cylinder while the presses are running and the webs making up a section are passing through the folder mechanism. We add to a conventional 3–2 folder mechanism, such as illustrated in the Patent No. 1,784,757 issued to D. J. Scott, December 9, 1930, means for indexing the folder blade drive shaft with respect to the folder cylinder which means comprises generally including an internally and externally helically cut connecting gear which engages a helically cut gear mounted on the folder blade drive shaft and which also engages an internally helically cut ring gear which engages and is driven by the folder drive means which also drives the folder cylinder. In addition, the helically cut connecting gear has means for moving it longitudinally along its axis so that the folder

blade drive shaft may be rotated with respect to the internally helically cut ring gear and the folder drive means. Provision is made also for the helically cut connecting gear to rotate about the folder blade drive shaft when driven by the helically cut ring gear and the folder drive means.

Referring to the drawings in which a preferred embodiment of our invention is shown.

FIG. 1 illustrates a top partial sectional view of a folder cylinder contained in a conventional 3–2 folder along with our novel improvement;

FIG. 2 is a sectional view of FIG. 1 taken along lines 2—2;

FIG. 3 is an enlarged end view of FIG. 1; and

FIG. 4 is a sectional view of FIG. 1 taken along lines 4—4.

Referring to FIG. 1 in detail, 1 illustrates generally a 3–2 folder, of the general type illustrated in Patent No. 1,784,757 having a frame 2 in which a folder cylinder 3 and a cutter 4 are rotatably journaled. The folder cylinder 3 in turn has therein a folder blade drive shaft 5 which extends parallel to the longitudinal axis of the folder cylinder. Drive shaft 5 in turn has locked thereon brackets 6 and 7 by means of keys 8 and 9. Brackets 6 and 7 in turn have rotatably mounted therein folder blade shafts 10 and 11 which have mounted thereon a plurality of folder blades 12.

Shaft 10 has mounted at one end a spur gear 13 which engages an idler gear 14 which in turn meshes with spur gear 15 which is fixed with respect to the frame 2 by means of a bolt 16. Shaft 11 has likewise mounted on an opposite end to shaft 10 a spur gear 17 meshing with idler gear 18 which in turn meshes with spur gear 19 fixed with respect to frame 2 by means of a bolt 20.

A spur gear 21 is mounted on the end of the folder blade drive shaft and, as shown in FIG. 4, meshes with spur gear 22, which in turn is connected to the folder drive shaft 23, shown in FIG. 2. An internally cut helical ring gear 24 is secured to spur gear 21 and is coaxial with the folder blade drive shaft 5. A helical gear 25 is attached to the end of folder blade drive shaft 5, as shown in FIGS. 1 and 4, and is in turn meshed with an internally and externally helical cut connecting gear 26. Helical connecting gear 26 is in turn journaled in a bracket 27 which is mounted on an antifriction bearing 28 so that the bracket and connecting gear are free to rotate about a worm 29. Worm 29 may be moved longitudinally of its axis by rotation of gear 30 which is driven by means of a second worm 31 which is connected by a set of bevel gears 32 and 33 to a driving motor 34. Thus it is seen that when driving motor 34 is actuated, that it will cause the worm 29, bracket 27, and helical connecting gear 26 to move longitudinally of the axis of the helical connecting gear to cause relative rotation of gears 24 and 25. Driving motor 34 and associated gears 29—31 are all covered by a bracket 37 which may be mounted on the end of existing 3–2 folder.

Referring to FIG. 2 there is shown a cross-section of a conventional 3–2 folder cylinder having therein holding pins 40 which operate in the customary manner. Cutting cylinder 4 has cutting knives 41 by which the webs W may be severed to form sheets of a desired length. The webs W pass from the presses (not shown) between the folder cylinder and the cutting cylinder past a safety gate 42 on around a substantial periphery of the folder cylinder 3.

The center of rotation of the folder blade drive shaft 5 is disposed eccentrically with respect to the folder cylinder 3 and gears 21 and 22 are so proportioned that the shaft 5 makes one and a half revolutions for each revolution of the folder cylinder 3, while the folding

blade shafts **10** and **11** make 3 revolutions about their own axes. By this means each folding blade has two non-working points within the cylinder surface and one working point or folding action while it is projecting through the cylinder at the place where folding rolls **43** and **44** are located. Cylinder **3** is a casting having its surface composed in parts of bands or strips so that the folding blades may project therethrough.

The cutting cylinder **4**, which is driven by spur gear **48** carried thereby and meshing with gear **49** carried on the cylinder **3**, is two-thirds the diameter of the cylinder **3** and carries the two cutting knives **41**. By this construction a pack of sheets is severed from the webs once to each third of a revolution of cylinder **3** by means of the knives **41** and one set of pins **40** continues to feed the web while another set feeds the pack of sheets. As the pack of sheets come opposite folding rolls **43** and **44**, a folding blade **12** takes the pack of sheets between the rolls while simultaneously the pins release the pack from the cylinder **3**.

If it is desired to collect two successive packs of sheets, a cam (not shown) which causes the withdrawal of the pins **40**, may be moved out of the way for every other set of pins, and folding blades on one of the folding blade shafts may be made non-operative by replacing bolt **16** with another bolt (not shown) which will fit through aperture **45** of the bracket **6** to fix the bracket with respect to the gear **15**. In this manner, every other pack of sheets severed from the web will be carried completely around cylinder **3** and will be associated with another pack of sheets; after which, the double pack will be folded off together when they reach rolls **43** and **44**.

It is seen that the helical connecting gear **26** will rotate about the axis of the folder blade drive shaft along with ring gear **24** and the helical gear **25**. If one desires to vary the instant at which the folding blades **12** contact the sheets extended about the periphery of the folding cylinder for different press speeds or in the event that packs of different thicknesses are being sent through the folder rolls **43** and **44**, the operator merely has to engage driving motor **34** to move the helical connecting gear **26** longitudinally of its axis and so rotate the folder blade drive shaft with respect to the driving means driving the spur gear **21** and connected to internally cut helical ring gear **24**. This in turn will vary the rotation or position of the folder blade drive shaft and consequently the folding blades **12** with respect to the folder cylinder since the folder cylinder is also connected to the folder drive means through a spur gear **50** carried on the folder drive shaft **23** and gear **49** mounted on cylinder **3** all as shown in FIG. 2.

Our novel blade positioning means may be easily added to existing folder equipment. All that is required is to remove the gear normally carried on the end of the folder blade drive shaft and replace it with gear **21**, the associated gears **24**, **25** and **26**, bracket **27** and associated driving motor and controls. The novel mechanism has a minimum of parts and each part is of conventional design thus keeping the cost on manufacture low.

It is apparent that the utilization of the helical ring gear, the helical gear, and the helical connecting gear, may be used in other applications where it is desired to rotate a member fastened to the ring gear with respect to a member fastened to the helical gear while both the helical ring gear and helical gear are rotating. By utilizing a helical connecting gear which is movable longitudinally of its axis, a greater moment may be achieved than when using a conventionally splined shaft. A further result of using this type of gearing is that backlash may be kept at a minimum since such gearing may be machined to high degrees of precision on existing gear cutting equipment.

We claim:

1. In a folder mechanism having a frame, a folder cylinder rotatable in said frame, folder drive means for rotating said cylinder, a folder blade drive shaft rotatably mounted within said cylinder and extending parallel to the longitudinal axis of said cylinder, brackets mounted on said folder blade drive shaft, at least one folder blade shaft rotatably mounted in said brackets having folder blades thereon, a first gear fixedly mounted with respect to said frame, a first gear train drivingly connecting said first gear with said folder blade shaft, a second gear mounted on said folder blade shaft, a second gear train connecting said folder blade shaft with said folder drive means, a helical connecting gear movable along its longitudinal axis and meshing both with an exterior helical cut gear mounted on said folder blade drive shaft and an interior helical cut ring gear in driving engagement with said folder drive shaft, whereby said folder blade shaft may be rotated with respect to said folder drive means while said folder drive cylinder is rotating.

2. A folder mechanism according to claim 1 having in addition means for moving said helical connecting gear longitudinally along its axis to rotate said helically cut gear with respect to said internal helically cut ring gear.

3. A folder mechanism according to claim 2 whereby the longitudinal axis of said helical cut connecting gear is coaxial with the longitudinal axis of said folder blade drive shaft.

4. A rotation imparting device for varying the rotation of a first member about a second member comprising, a helical gear mounted on and coaxially with said first member, an internally cut helical ring gear of larger diameter than said helical gear mounted on said second member and coaxially with said first and second member, an internally and externally helical connecting gear in meshing engagement with and separating said helical gear and said internally cut helical ring gear, and means for moving said helical connecting gear longitudinally of its axis in order to rotate said ring gear and second member with respect to said helical gear and said first member.

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