Jan. 6, 1953 C. A. HARLESS 2,624,572

FOLDING CYLINDER BLADE ADJUSTING MECHANISM

Filed Nov. 19, 1948 2 SHEETS--SHEET 1

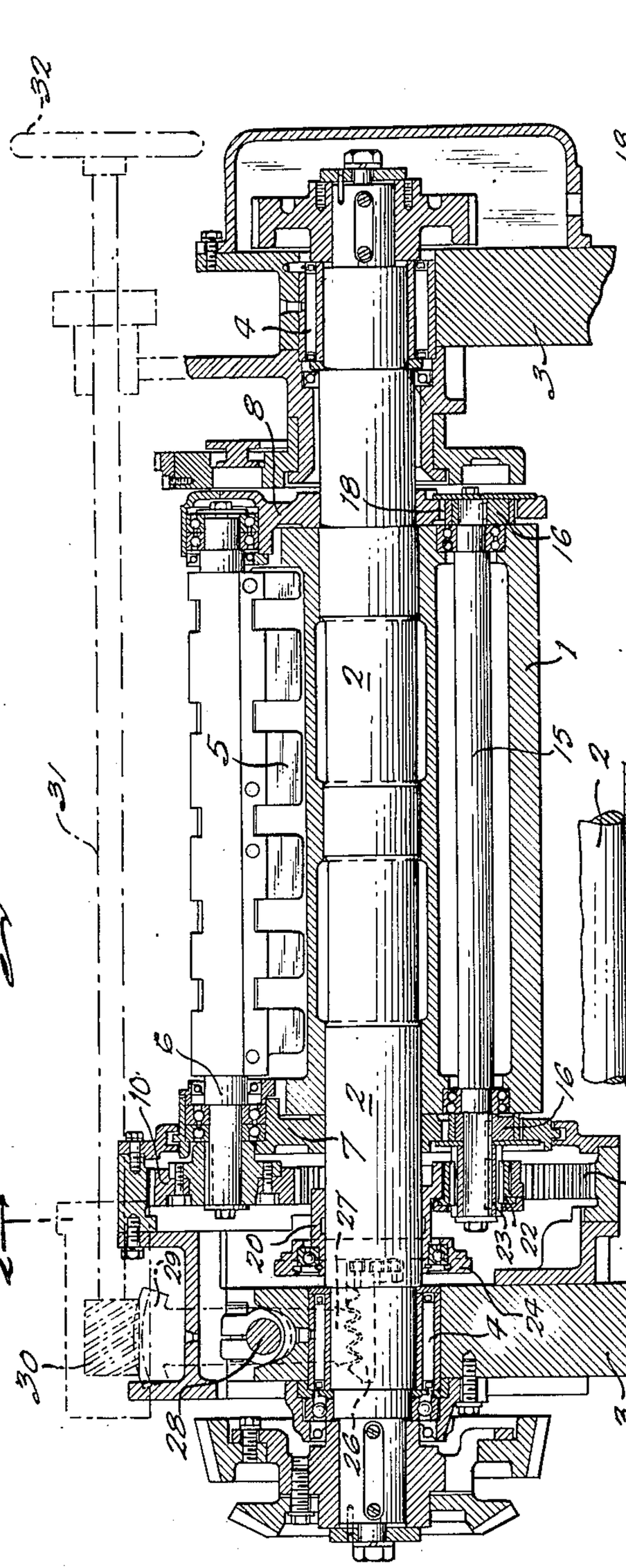

Fig. 1

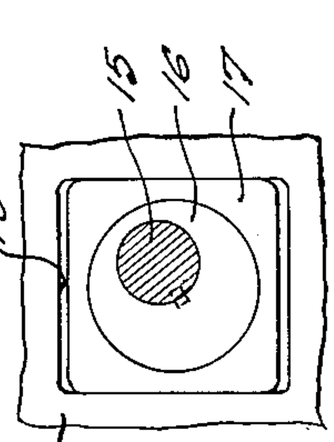

Fig. 4

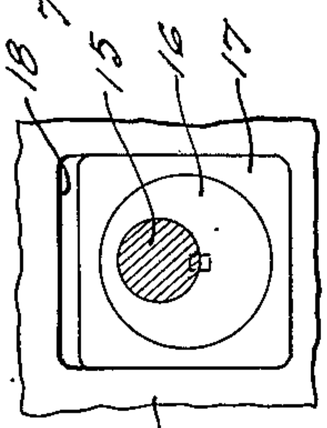

Fig. 3

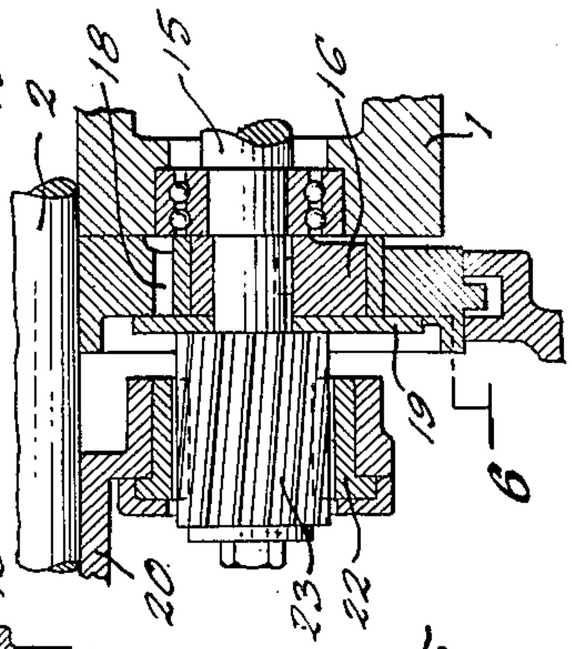

Fig. 5

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FOLDING CYLINDER BLADE ADJUSTING MECHANISM

Filed Nov. 19, 1948 2 SHEETS—SHEET 2

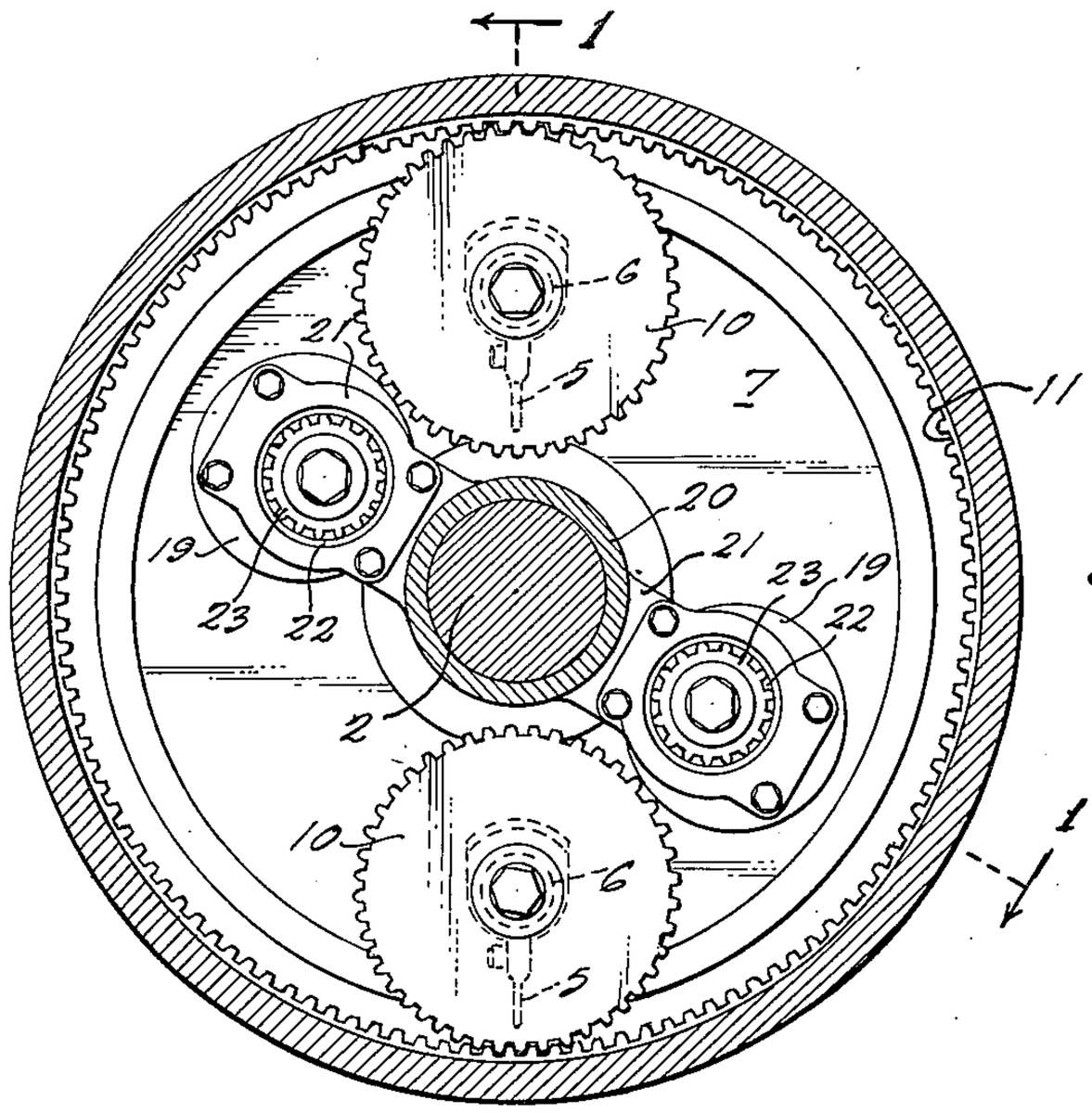

Fig. 2

Fig. 4

Fig. 3

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FOLDING CYLINDER BLADE ADJUSTING MECHANISM

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13 Claims. (Cl. 270—77)

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This invention relates to folding cylinders for printing machines.

The general object of the invention is to provide improved mechanism for adjusting the folding blades of a folding cylinder.

With this general object and more specific objects which will appear from the following full description in mind, the invention consists in the combinations and arrangements of parts and details of construction which will now first be fully described with reference to the accompanying drawing, and will then be more particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a longitudinal section through a folding cylinder and associated parts and is taken on the line 1—1 of Figure 2;

Figure 2 is a cross section on the line 2—2 of Figure 1;

Figure 3 is a view in plan of part of the mechanism of Figure 1, certain parts being removed to show the construction more clearly;

Figure 4 is an end view of part of the mechanism of Figure 1;

Figure 5 is an enlarged view of a part of Figure 1;

Figure 6 is a section on the line 6—6 of Figure 5; and

Figure 7 is a section similar to Figure 6, but showing the parts in a different position of adjustment.

The elements cooperating with a folding cylinder of the type disclosed herein as well as the specific construction and mode of operation of the various mechanisms of the cylinder are well known in the art, being shown for example, in Halliwell Patent No.1,722,745, and will be referred to herein only to the extent necessary for a full understanding of the present invention.

Referring now to Figures 1 and 2, the folding cylinder comprises a body 1 fixed to a shaft 2, which is rotatably journaled in frame members carried by shafts 6 which are journaled in antiable gearing, as usual. The folding blades 5 are carried by shafts 6 wihch are journaled in antifriction bearings in bearing plates 7 and 8 as indicated. Except as prevented by the mechanism described below, plates 7 and 8 are free to turn on the shaft 2 and with relation to the body 1 which is fixed to it. In the cylinder shown in Figures 1 and 2, there are two folding blade shafts 6, and these are driven by means of planet gears 10 which mesh with a stationary internal ring gear 11 and thus are driven when the shaft 2 and the parts carried thereby rotate.

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A pair of shafts 15 are carried in anti-friction bearings in the cylinder, and preferably by body 1 as shown in Figure 1, and serve to couple the plates 7 and 8 to the body 1 for rotation therewith and also to adjust the angular position of the plates with relation to the body 1. For this purpose, each shaft 15 carries on each of its ends an eccentric 16 (Figures 1, 5 and 6) which operates in a block 17 which, in turn, is slidably carried in a rectangular opening 18 within the plate 7 or 8 as the case may be. The blocks 17 are permitted to slide in the radial direction (up and down in Figures 5 and 6) but are held in the plates 7 and 8 against sliding in the circumferential direction. Rotation of the eccentric 16 by means of shaft 15 will accordingly shift the plate 7 or 8, as the case may be, circumferentially with relation to the axis of the shaft 15 to a position such as indicated in Figure 7 or to any other desired position within the range of adjustment provided. Rotation of the shaft 15 in the opposite direction will shift the plates 7 and 8 similarly but in the opposite direction. If shafts 15 are held against rotation relatively to the body 1, the plates 7 and 8 will also be held in their adjusted position.

Cam connections for turning the shafts 15 to advance or retard the plates 7 and 8 relative to the body 1 and for holding them in adjusted position are provided and include a yoke 20 rotatably and slidably mounted on the shaft 2 and movable axially thereof by mechanism described below. The yoke 20 has a pair of arms 21 which carry quick-acting helical nuts 22, the nuts being fixed to the arms so as to prevent rotation, and cooperating with mating quick-acting screws 23 fixed to the ends of shafts 15 and extending through the nuts 22. As the yoke is moved axially of the cylinder (to the right or left of Figure 1) it will be prevented from rotating with relation to the body 1 by reason of the engagement of the nuts 22 and screws 23. The nuts 22, being held against rotation by the arms 21, will accordingly turn the screws 23 and the shafts 15 to which they are attached. This turning of the shafts 15 causes the plates 7 and 8 to be advanced or retarded as before described. The advancing or retarding of the plates also advances or retards the movement of the folding blade shafts 6, thus adjusting the fold in the usual way.

The yoke 20 is slid backward and forward by a non-rotating collar 24 connected to it by means of a ball bearing 25 which permits relative rotation of the yoke 20 while coupling it to the collar for movement along the shaft 2. Racks 26 are

attached to the collar **24** and are in mesh with gear sectors **27** which are carried by a cross shaft **28**. Cross shaft **28** in turn carries a worm wheel section **29** which meshes with a worm **30** operated by means of a shaft **31** and hand wheel **32**. As will be apparent, turning the worm **30** by means of the hand wheel **32** will also turn the worm wheel sector **29** and the shaft **28** to which it is attached, and the gear sectors attached to the shaft **28** will move the racks **26** axially of the cylinder, the direction of movement corresponding to the direction of rotation of the hand wheel **32**. Collar **24** attached to the racks **26** will accordingly move the yoke **20** inwardly or outwardly from the body **1**, thus advancing or retarding the plates **7** and **8** as desired for adjusting the angular position of the folding blades with relation to the cylinder body and other mechanisms carried thereby.

It will be observed that shafts **15** and the parts carried thereby as well as the yoke **20** and the parts carried by the yoke are placed symmetrically about the axis of the shaft **2** so that balance of the cylinder is maintained in all positions of adjustment. Also, the frictional resistance which is introduced is merely that of the ball bearing **25**, and, since the pressure on this bearing in any position of adjustment is negligible, the parts are subject to substantially no wear and hence any tendency to create looseness in continued operation is eliminated. While the quick-acting nut and screw arrangement **22** and **23** is preferred, the invention in its broader aspects contemplates the use of any cam connection capable of converting the sliding movement of the yoke **20** into a rotary movement of the shafts **15**.

What is claimed is:

1. In a folding cylinder of the type comprising a cylinder body, a drive shaft therefor, a relatively rotatable bearing plate at each end of the cylinder body and mounted for rotation about its axis, folding blades mounted on second shafts journaled in the bearing plates and planetary pinions carried by the second shafts for rotating the same, and in combination, a pair of third shafts journaled in the cylinder body, extending longitudinally thereof and disposed symmetrically about its axis, means carried by each third shaft and engaging the bearing plates at each end thereof for moving the same angularly about the cylinder axis with relation to the cylinder body, a yoke surrounding and mounted for sliding movement longitudinally of the drive shaft, a cam connection between the yoke and each of the pair of third shafts for turning the latter as the yoke is moved, and said cam connections comprising a pair of cooperating cam elements, one carried by and rigid with the yoke and the other carried by and rigid with the said third shaft, a non-rotating operating member for moving the yoke, and an anti-friction bearing connecting the last said member with the yoke for moving the yoke while permitting rotation thereof.

2. The combination according to claim 1, in which the operating member comprises a collar surrounding the cylinder shaft and supported by means of the anti-friction bearing which connects it to the yoke.

3. The combination according to claim 2, in which the collar carries racks extending backwardly along the cylinder shaft and at opposite sides thereof, and comprising also rotatably adjustable gear elements in mesh with the racks for adjusting the position of the collar.

4. The combination according to claim 3, comprising worm and worm wheel mechanism for rotatably adjusting the gear means in mesh with the racks.

5. The combination according to claim 1, in which the means engaging the bearing plates for moving them angularly about the cylinder axis comprise eccentrics carried by the said pair of shafts and cooperating means carried by the bearing plates in engagement with the eccentrics.

6. The combination according to claim 1, in which the means engaging the bearing plates for moving them angularly about the cylinder axis comprise eccentrics carried on the said pair of third shafts and blocks receiving the eccentrics and mounted in the bearing plates for radial movement with respect thereto.

7. The combination according to claim 1, in which the cam connection between the yoke and each of the pair of third shafts comprises a quick-acting nut carried by one of the elements and a quick acting screw carried by the other.

8. The combination according to claim 7, in which the nut is carried by the yoke, and the screw is carried by the shaft and passes through the nut.

9. In a folding cylinder comprising a cylinder body, a drive shaft therefor, a relatively rotatable bearing plate at each end of the cylinder body and mounted for rotation about its axis, folding blades mounted on second shafts journaled in the bearing plates and planetary pinions carried by the shafts for rotating the same, and in combination, an adjusting shaft journaled in the cylinder body and extending longitudinally thereof, eccentric blocks slidably mounted in the bearing plates for movement radially thereof, eccentrics carried by the adjusting shaft at each end thereof and engaging in the eccentric blocks for adjusting the angular position of the bearing plates about the cylinder axis, a member mounted for rotation with the cylinder body and for sliding movement longitudinally of the drive shaft, a cam connection between the said member and the adjusting shaft for turning the latter as the member is moved, a non-rotating member for moving the first said member, and an anti-friction bearing connecting the two said members for moving the first said member while permitting rotation thereof.

10. In a folding cylinder comprising a cylinder body, a drive shaft therefor, a relatively rotatable bearing plate at each end of the cylinder body and mounted for rotation about its axis, folding blades mounted on shafts journaled in the bearing plates and planetary pinions carried by the shafts for rotating the same, and in combination, a pair of adjusting shafts juornaled in the cylinder and extending longitudinally thereof and disposed symmetrically about its axis, eccentric connections between the cylinder body and the bearing plates and comprising eccentrics carried by the adjusting shafts for movement therewith, and means for rotatably adjusting the adjusting shafts for advancing and retarding the bearing plates with relation to the cylinder body.

11. The combination according to claim 10, in which the adjusting shafts are journaled in the cylinder body and carry eccentrics engaging in the bearing plates.

12. The combination according to claim 10, in which a yoke slidable along the adjusting shafts is provided for rotatably adjusting the same, and is connected thereto and slidably supported thereon by means of cam connections for turning the shafts as the yoke is moved.

13. In a folding cylinder comprising a cylinder body, a drive shaft therefor, a relatively rotatable bearing plate at each end of the cylinder body and mounted for rotation about its axis, folding blades mounted on shafts journaled in the bearing plates and planetary pinions carried by the shafts for rotating the same, and in combination, means for advancing and retarding the bearing plates with relation to the cylinder body and actuating mechanism therefor comprising a yoke surrounding the drive shaft slidable therealong and rotatable with the cylinder, a collar slidable along the drive shaft and held from rotation therewith, and an anti-friction bearing connecting the yoke and collar for sliding the yoke while permitting it to rotate, and means operable by the yoke for moving the bearing plates in accordance with the sliding movement of the yoke.

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