March 8, 1938. J. L. MAYER 2,110,272

RUNNING REGISTER

Filed Nov. 24, 1936 3 Sheets-Sheet 1

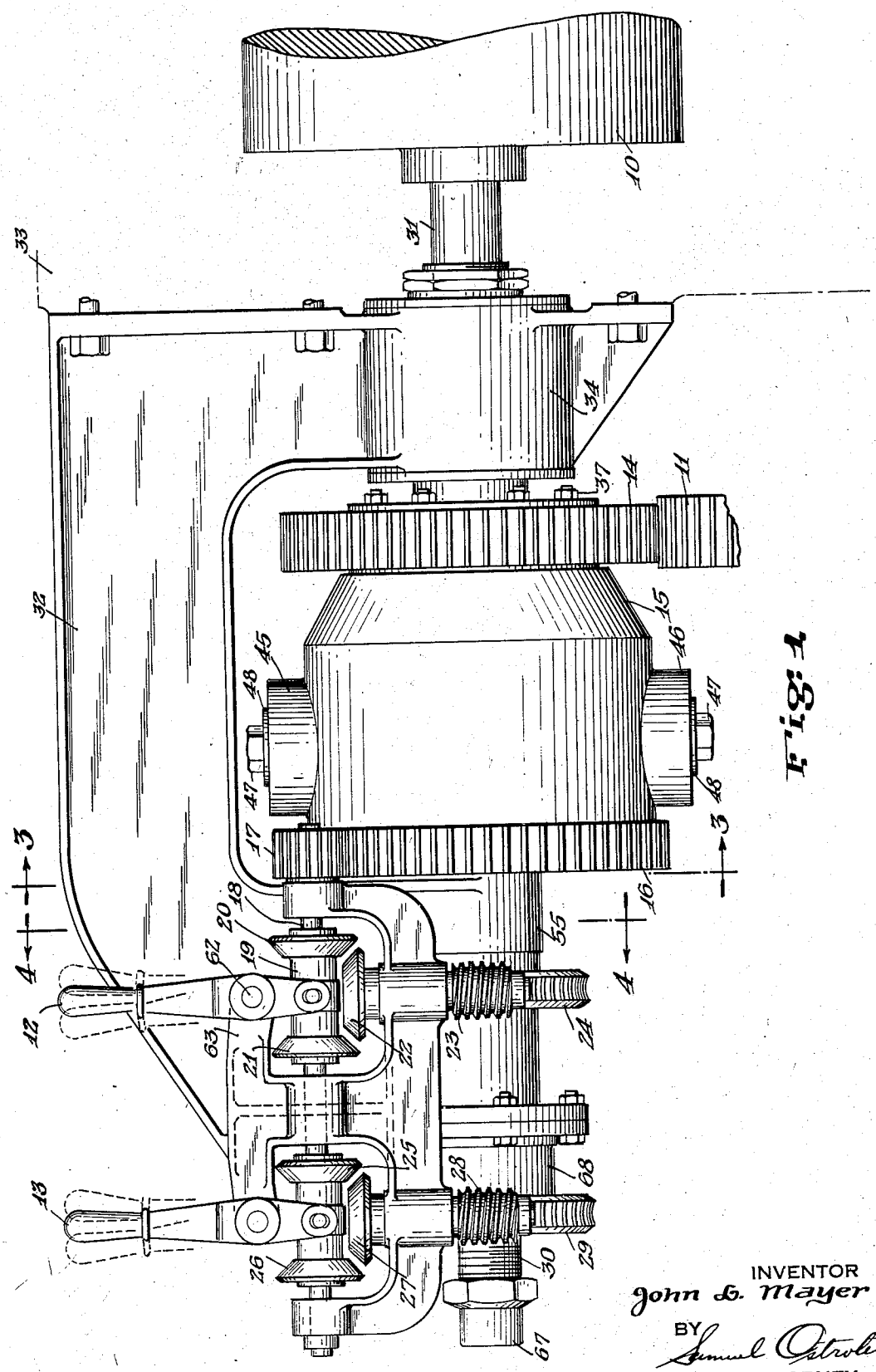


Fig. 1

INVENTOR
John L. Mayer
BY
Samuel Ostrolenk
ATTORNEY

March 8, 1938. J. L. MAYER 2,110,272

RUNNING REGISTER

Filed Nov. 24, 1936 3 Sheets-Sheet 2

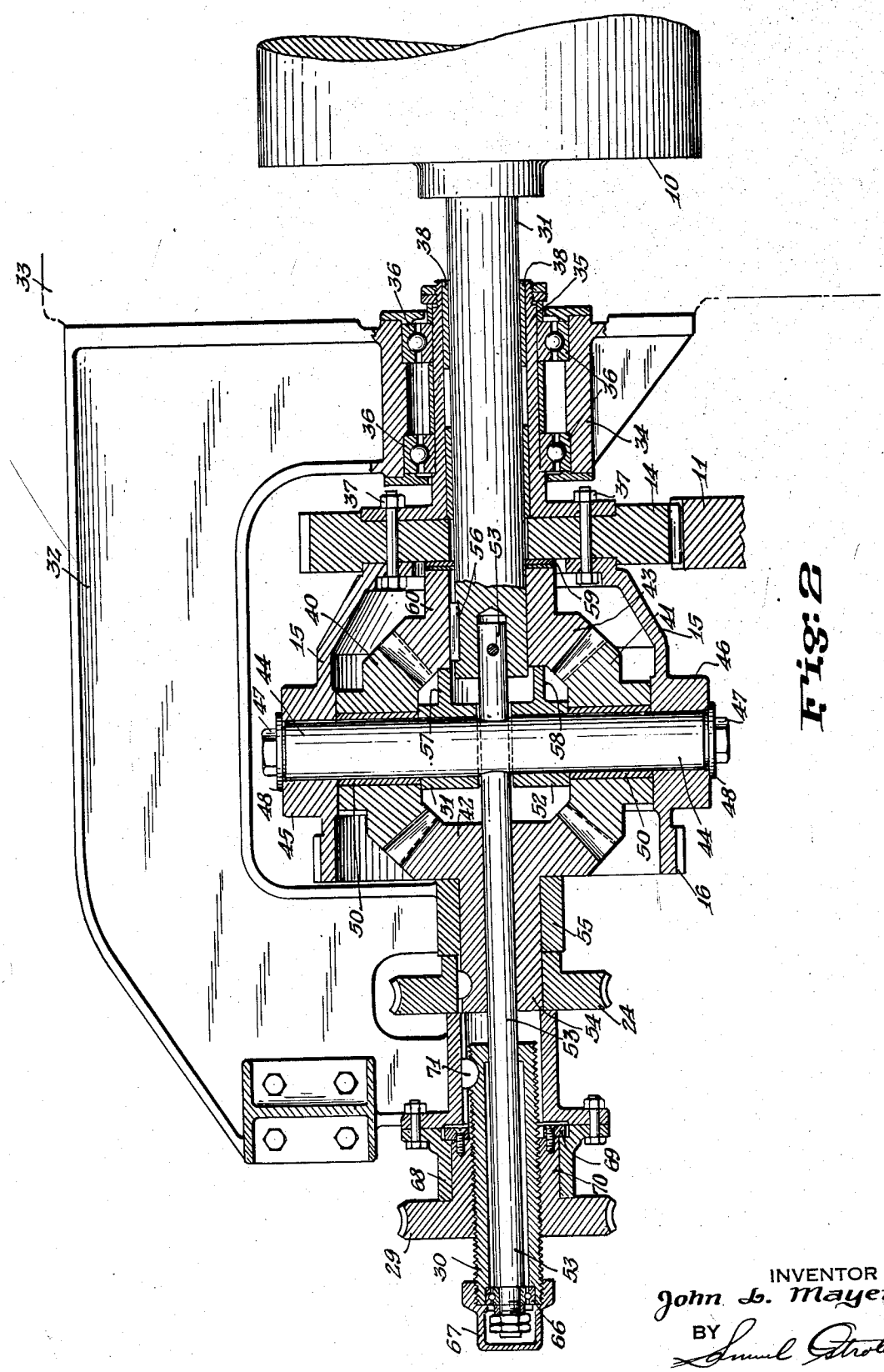


Fig: 2

INVENTOR
John L. Mayer
BY Samuel Strobach
ATTORNEY

March 8, 1938. J. L. MAYER 2,110,272

RUNNING REGISTER

Filed Nov. 24, 1936 3 Sheets-Sheet 3

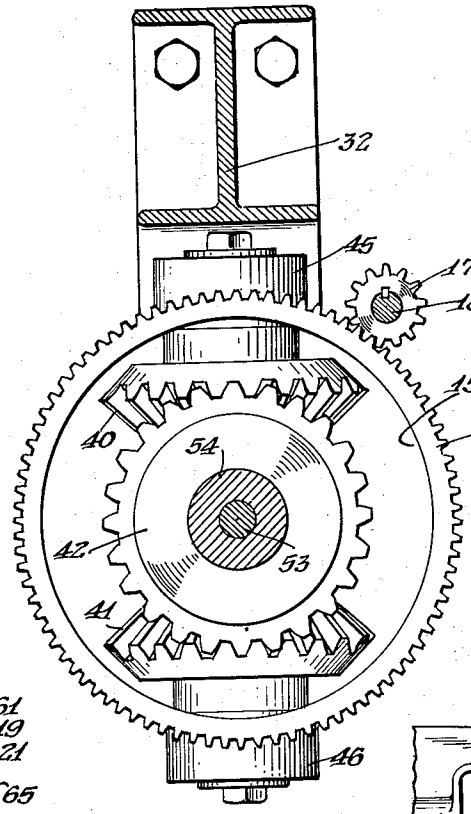


Fig: 3

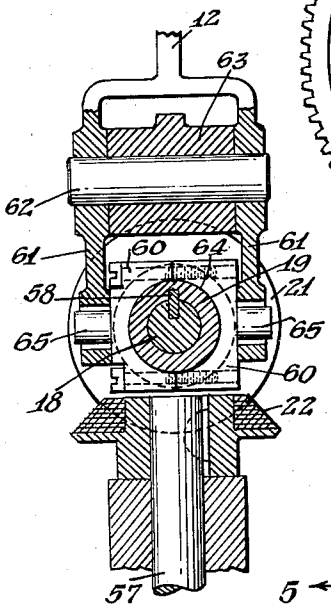


Fig: 6

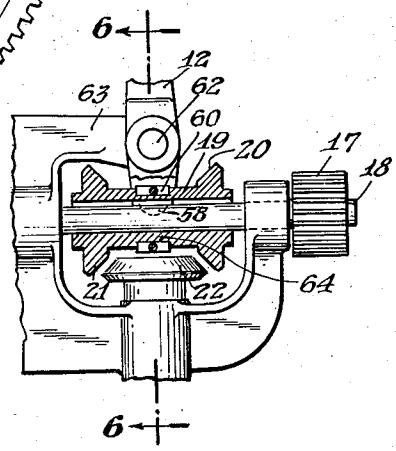


Fig: 5

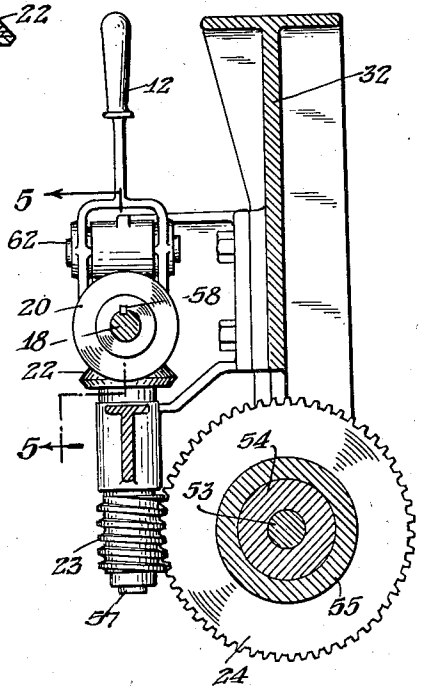


Fig: 4

INVENTOR
John L. Mayer
BY
Samuel Stewart
ATTORNEY

Patented Mar. 8, 1938

2,110,272

UNITED STATES PATENT OFFICE

2,110,272

RUNNING REGISTER

John L. Mayer, Brooklyn, N. Y., assignor to S. & S. Corrugated Paper Machinery Co., Inc., Brooklyn, N. Y., a corporation of New York

Application November 24, 1936, Serial No. 112,505

11 Claims. (Cl. 74—395)

This invention relates to running registers for rotating members and more particularly relates to a novel method of and means for providing angular and axial adjustment upon a rotating drum such as a printing cylinder.

Running registers are mechanisms for superimposing a movement upon the shaft of a rotating drum while the drum is in operation to bring it into proper relation with sheet blanks operated on. Prior running registers were intricate devices requiring individual power operation such as separate motor drives. Involved and complex designs were used, resulting in very expensive machines. The cost, maintenance and repair of prior running registers made them prohibitive for small and simple machinery where they could have been employed to special advantage.

In accordance with my present invention, I provide a simple running register with relatively few component parts, operative from the rotative power applied to drive the drum. Two hand levers are used to independently operate the axial and the angular registering mechanisms.

It accordingly is an object of my present invention to provide a novel method of and means for angularly and/or axially registering a rotating member.

Another object of my invention is to provide a novel running register controlled from power which operates the drum to be registered.

A further object of my present invention is to provide a novel running register of compact and simple construction with relatively few components to get out of order.

These and other objects of my invention will become apparent in the following description taken in connection with the drawings, in which:

Figure 1 is an end elevational view of a preferred embodiment of my invention.

Figure 2 is a vertical cross-sectional illustration through the registering mechanism of Figure 1.

Figure 3 is a cross-sectional view taken along 3—3 of Figure 1 showing the engagement of the angular registration gearing.

Figure 4 is a cross-sectional view taken along 4—4 of Figure 1 showing the end elevation of the manual control for the registering operations; and

Figures 5 and 6 are detailed cross-sectional views of the control mechanism drive.

Figure 1 illustrates a preferred arrangement of the running register of my present invention as applied to a rotatable drum 10 normally driven by a drive gear 11. The illustrated running register accomplishes angular registration in a clockwise or counter-clockwise sense by shifting of the hand lever 12 to the right or left. The axial adjustment of drum 10 to the right or left is accomplished by operating the lever 13. The rotative power is transmitted to drum 10 by drive gear 11 through the gear 14 which is secured to the differential housing sleeve 15. Another gear 16 is provided integral with the left end of sleeve 15. Gear 16 accordingly is directly driven from power gear 11 through gear 14.

A pinion 17 is arranged to engage with gear 16 so as to be continuously driven thereby while drive gear 11 operates. Positively driven pinion 17 is keyed to the right end of the control shaft 18. Control shaft 18 is accordingly continuously rotated during the operation of drum 10. Friction cone member 19 is slidably keyed to shaft 18 as will be hereinafter described in more detail so that lever 12 may be used to engage either of the friction cones 20 or 21 with friction cone 22. Friction cone 22 may therefore be driven in either direction under the control of the operator from the normal power transmitting system. Friction cone 22 is connected with worm 23. Worm 23 meshes with worm gear 24 to rotate it in either sense. The rotation of worm gear 24 produces a relative angular displacement between drum 10 and the gears 11 and 14. The operation of the angular adjusting mechanism by worm gear 24 will be described in full detail hereinafter.

The axial or longitudinal adjustment of drum 10 while it is being driven is accomplished by engaging either of friction cones 25 or 26 with the friction cone 27 by means of hand lever 13. Rotation of friction cone 27 in either direction will cause a corresponding rotation of worm 28 to rotate worm gear 29. The rotation of worm gear 29 cooperates with the threaded member 30 to axially displace drum 10 to the right or left in accordance with a predetermined direction of rotation of worm gear 29. The operation of the axial registration of drum 10 will be described fully in connection with Figure 2.

The running register is appended to one end of the drum shaft 31, and is supported by an extension bracket 32 connected to the main frame 33 of the machine. Drum shaft 31 is rotatably supported within bearing housing 34.

Figure 2 is a vertical cross-sectional view taken centrally through the running register mechanism. Gear 14 is rotatably supported in bearing housing 34 by means of a sleeve 35 coacting with

the inner racers of a pair of roller bearings 36. The outer racers of roller bearings 36 are secured to the housing 34. Sleeve 15 is rigidly connected to gear 14 by bolts 37. Drum shaft 31 is rotatably supported within sleeve 35 by bushings 38. Gear 14 is accordingly free to rotate with respect to drum shaft 31.

The angular adjustment in my present invention is accomplished by means of a novel differential gear connection between the driven gear and the drum shaft 31, said differential gearing being contained within sleeve 15. The differential gearing comprises four ninety-degree bevel gears 40, 41, 42, and 43. Bevel gears 40 and 41 are rotatably supported within housing 15 by means of rod 44, rigidly supported between opposed cylindrical projections 45 and 46 from sleeve 15. Rod 44 is preferably secured into position by means of nuts 47 and washers 48 although other securing means for simplifying the assembly may be employed. Bevel gears 40 and 41 are rotatably mounted upon rod 44 by means of bushings 50. Bevel gears 40 and 41 are held in position against the inside surface of sleeve 15 by means of sleeve members 51 and 52. The normal rotation of sleeve 15 accordingly carries bevel gears 40 and 41 around in a circular path as will be understood by those skilled in the art. An extension shaft 53 is pinned to the end of drum shaft 31 and projects through a circular opening in the center of rod 44. Extension shaft 53 is employed for axial adjustment of drum 10 hereinafter described.

The hub 54 of bevel gear 42 is rotatably supported in bearing 55 of bracket 32. The extension shaft 53 projects through the center of the bevel gear 42. The worm gear 24 is keyed to the end of the hub 54 and serves to hold the bevel gear 42 in position. The opposite bevel gear 43 is slidably keyed to drum shaft 31 by key 56. Bevel gear 43 is held against axial displacement by projections 57 and 58 of the sleeves 51 and 52 respectively, and by the washers 59 at the right end of hub 60.

Worm gear 24 is normally interlocked with the worm 23 (see Figs. 1 and 4). Accordingly, the bevel gear 42, keyed to worm gear 24, is held fixed against rotation. Gear 14, driven by drive gear 11, rotates the sleeve 15 and rod 44 to carry bevel gears 40 and 41 around bevel gear 42 in a circular path. Since gears 40, 41 and 42 are in constant meshing relationship, and since bevel gear 42 is held against rotation, the bevel gears 40 and 41 will rotate while being carried in a circular path around gear 42. Bevel gear 43 is also intermeshed with bevel gears 40 and 41 and is accordingly rotated thereby. The rotation of bevel gear 43 turns drum shaft 32 and drum 10 due to the key 56 connection therebetween. The normal rotation of drum 10 is accordingly accomplished by keeping bevel gear 42 from rotating through the interlock of worm 23 and worm gear 24, and through the driving of bevel gear 43 by the opposed rotating bevel gears 40 and 41 as will now be evident to those skilled in the art. The sense of rotation of drum 10 is in the same direction as that of the rotation of driven gear 14 and continues in a positive driving relationship so long as bevel gear 42 is held against rotation.

The angular adjustment or registration of drum 10 while it is being driven is accomplished by causing the rotation of bevel gear 42 during the power transmission between gear 14 and drum 10 through the differential gearing 40 to 43. The rotation of bevel gear 42 in a clockwise or counter-clockwise sense will either correspondingly add to or subtract from the normal speed of rotation of the idler bevel gears 40 and 41 to correspondingly add to or subtract from the normal angular rotative speed of drum 10. In the preferred embodiment, the diameter of bevel gears 42 and 43 are made the same so that an equal angular displacement or increment of motion of bevel gear 43 occurs corresponding to the displacement of the bevel gear 42. The angular displacement of bevel gear 42 is accomplished by the rotation of worm gear 24 through worm 23 by operation of the hand lever 12. A clockwise rotation of bevel gear 42 and worm gear 24, in the illustrated embodiment, will cause an equal but counter-clockwise angular displacement of the bevel gear 43 and the drum 10, and a corresponding reversed relation applies to the counter-clockwise rotation of bevel gear 42.

Figure 3 is a cross-sectional view taken along 3—3 of Figure 1 showing the engagement of bevel gear 42 with idler bevel gears 40 and 41 within the sleeve 15. The pinion 17 keyed to control shaft 18, is shown meshing with the spur gear 16 integral with sleeve 15.

Figure 4 is an end view of the angular adjusting control mechanism as viewed along 4—4 of Figure 1. Worm 23 normally interlocks with worm gear 24 to prevent the bevel gear 42 from rotating. Worm 23 is secured to rod 57 which in turn is keyed to the friction cone 22.

Figure 5 is a cross-sectional view taken along 5—5 of Figure 4 illustrating the control connection of the friction cone member 19 with the control shaft 18 and the hand lever 12. The friction cone member 19 has integral therewith friction cones 20 and 21, and is slidably keyed to control shaft 18 by a feather key 58. Friction cone member 19 accordingly rotates with pinion 17 and shaft 18. A split-ring 60 is secured loosely upon an annular recess in the center of member 19. Ring 60 is pivotally connected to rod 12 as shown in more detail in Figure 6.

Figure 6 is an enlarged cross-sectional view taken along 6—6 of Figure 5 illustrating the preferred connection between control lever 12 and the friction cone member 19. Lever 12 contains a fork 61 which is pivoted upon pin 62 supported in the bracket 63. The split-ring 60 is set into the annular groove 64 of member 19 and contains projections 65 which are set into the fork 61. Lever 12 accordingly readily controls the engagement of friction cones 20 or 21 with friction cone 22 while maintaining a rotative connection between pinion 17 and the member 19.

Optional engagement of either cone 20 or 21 with cone 22 will cause a corresponding clockwise or counter-clockwise rotation of worm gear 24 through worm 23. Lever 12 may be designed to normally remain in neutral or non-engaging position in order to require a manual engagement of the friction cones to change the angular position of worm gear 24 and correspondingly effect the angular registration of drum 10. The power for the angular registration is obtained from the motive power normally rotating the drum 10 and is operable only during the rotation thereof. A preferred operating procedure is to drive the drum 10 at a slow rate to test the registration of the drum and adjust its angular registration by the operation of lever 12 at the reduced speed in order to save the number of wasted blanks until correct registration is obtained. Operating lever 12 to the left or the right will cause a clockwise or counter-clockwise

angular shift of drum 10 with respect to the driving gears 11 or 14. The sense of angular correction of drum 10 with respect to the operation of lever 12 is predetermined by the relative directions of rotation of the component gears of the control mechanism.

In the preferred illustration of my invention, I also include an axial adjustment of the drum 10 operable from the common control shaft 18 by a second hand lever 13 (as hereinabove described in connection with Figure 1). The structure for the control of worm 28 and worm gear 29 by lever 13 through friction cone 27 is similar to the control of worm 23 and worm gear 24 by lever 12, illustrated in Figures 4, 5, and 6. The extension shaft 53 is rotatably connected to the threaded member 30 by a roller bearing 66 attached to the left end thereof as seen in Figure 2. A cap 67 protects this end portion. Worm gear 29 is rotatably secured to sleeve 68 projecting from and bolted to the frame 32. An annular ring 69 is secured to the hub 70 of worm gear 29 and projects up into a recess formed by sleeve 68 in order to hold gear 29 against axial displacement. The interior of worm gear 29 and its hub 70 is threaded to coact with the threaded portion of member 30. The threaded member 30 is slidably keyed to the frame 32 by feather key 71. Threaded sleeve member 30 is accordingly only movable axially and restrained from rotating. Worm gear 29 is only rotatable and restrained from axial movement.

By causing the worm gear 29 to turn in response to a control movement of axial control lever 13, the coacting threaded portions of worm gear 29 and sleeve 30 forces the member 30 axially to the right or left in correspondence with the sense of rotation of the gear 29. The thrust bearing 66, while permitting continuous rotation of extension shaft 53 carries the shaft 53 axially with member 30 to effect the axial or longitudinal adjustment with drum 10 as will now be evident to those skilled in the art. Axial registration to the right or left is accomplished by a clockwise or counter-clockwise rotation of the worm gear 29 corresponding to a proper manual shifting of control lever 13.

The angular and axial registration of drum 10 with the mechanism of my present invention may be accomplished simultaneously by corresponding engagement of levers 12 and 13. This adjustment is made while the machine is in operation, preferably at a slow speed.

Although I have illustrated and described a running register embodying both axial and angular registration, it is to be understood that the principles disclosed may be used for a running register using a single adjustment such as the angular or the axial for the rotating drum. A printing drum is generally provided with both the angular and axial adjustments, while a slotter-head is generally provided only with the angular adjustment. Modifications of the preferred arrangement of my invention may be made by those skilled in the art without departing from the broader spirit and scope thereof, and I do not intend to be limited except as set forth in the following claims.

What is claimed is:

1. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first gear keyed to said driven shaft; a second gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft; and means operable by said driven gear for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum.

2. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first gear slidably keyed to said driven shaft; a second gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft; means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum, said means being operable by power transmitted to said driven gear; an extension shaft fastened to said driven shaft extending centrally through said second gear; and mechanism operable from said transmitted power for changing the axial position of said drum.

3. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first gear keyed to said driven shaft; a second gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft; means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a third gear secured to said second gear, gear means meshing with said third gear, and means for driving said gear means from said driven gear in either direction.

4. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first gear keyed to said driven shaft; a second gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotatable power between said driven gear and said driven shaft comprising a sleeve member attached to and extending from said driven gear, gear means rotatably mounted within said sleeve engaging said first and second gears; and means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum, said means being operable by power transmitted to said driven gear.

5. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first bevel gear keyed to said driven shaft; a second bevel gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft comprising a sleeve member attached to and extending from said driven gear, gear means rotatably mounted within said sleeve engaging said first and second gears; and means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a worm gear secured to said second gear, a worm meshing with said worm gear, and means for driving said worm from said driven gear in either direction.

6. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first bevel gear keyed to said driven shaft; a second bevel gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft comprising a sleeve member attached to and extending from said driven gear, a third bevel gear rotatably mounted within said sleeve engaging said first and second gears; and means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a worm gear secured to said second gear, a worm meshing with said worm gear, and means for driving said worm from said driven gear in either direction comprising a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, and a pinion attached to said control shaft and meshing with said sleeve gear.

7. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear rotatably mounted on said driven shaft; a first bevel gear keyed to said driven shaft; a second bevel gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft comprising a sleeve member attached to and extending from said driven gear, a third and fourth bevel gear rotatably mounted within said sleeve engaging said first and second gears; and means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a worm gear secured to said second gear, a worm meshing with said worm gear, and means for driving said worm from said driven gear in either direction comprising a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, and a pinion attached to said control shaft and meshing with said sleeve gear, means for rotating said worm in either sense comprising a friction cone member slidably keyed to said control shaft, a friction cone connected to said worm, and a hand lever for operating said friction cone member against said friction cone.

8. A runnnig register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear; a first gear slidably keyed to said driven shaft; a second gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said driven shaft comprising a sleeve member attached to and extending from said driven gear, gear means rotatably mounted within said sleeve engaging said first and second gears; means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a worm gear secured to said second gear, a worm meshing with said worm gear, and means for driving said worm from said driven gear in either direction, comprising a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, and a pinion attached to said control shaft and meshing with said sleeve gear; an extension shaft fastened to said driven shaft extending centrally through said second gear; and mechanism operable from said control shaft for changing the axial position of said drum.

9. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear; a first bevel gear slidably keyed to said shaft; a second bevel gear mounted coaxially with said first gear; mechanism cooperating with said second gear for transmitting rotative power between said driven gear and said shaft comprising a sleeve member attached to and extending from said driven gear, a third bevel gear rotatably mounted within said sleeve engaging said first and second gears; means for changing the angular position of said second gear for correspondingly controlling the angular registration of said drum comprising a worm gear secured to said second gear, a worm meshing with said worm gear, and means for driving said worm from said driven gear in either direction including a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, and a pinion attached to said control shaft and meshing with said sleeve gear; an extension shaft fastened to said driven shaft; and mechanism operable from said control shaft for changing the axial position of said drum comprising a second worm gear held against axial displacement, a threaded sleeve member held against angular displacement, said extension shaft being rotatably secured to said threaded member, a second worm engaged with said second worm gear, means for rotating said second worm in either sense comprising a friction cone member slidably keyed to said control shaft, a friction cone connected to said second worm, and means for engaging said friction cone member with said friction cone.

10. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear, mechanism operable from said driven gear for changing the axial position of said drum comprising a worm gear held against axial displacement, a threaded sleeve member held against angular displacement, said shaft being rotatably secured to said threaded member, a worm engaged with said worm gear, means for rotating said worm in either sense comprising a sleeve member attached to and extending from said driven gear, and a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, and a pinion attached to said control shaft and meshing with said sleeve gear.

11. A running register for a rotatable drum secured to a driven shaft arranged to be rotated by a drive gear comprising a driven gear, mechanism operable from said driven gear for changing the axial position of said drum comprising a worm gear held against axial displacement, a threaded sleeve member held against angular displacement, said shaft being rotatably secured to said threaded member, a worm engaged with said worm gear, means for rotating said worm in either sense comprising a sleeve member attached to and extending from said driven gear, a sleeve gear integral with said sleeve, a control shaft operatively connectible with said worm, a pinion attached to said control shaft and meshing with said sleeve gear a friction cone member slidably keyed to said control shaft, a friction cone connected to said worm, and a lever for operating said friction cone member against said friction cone.

JOHN L. MAYER.