

March 11, 1941.

C. JACOBSON

2,234,674

MITER GEAR ADJUSTMENT FOR RUNNING REGISTER

Filed July 30, 1938

2 Sheets-Sheet 1

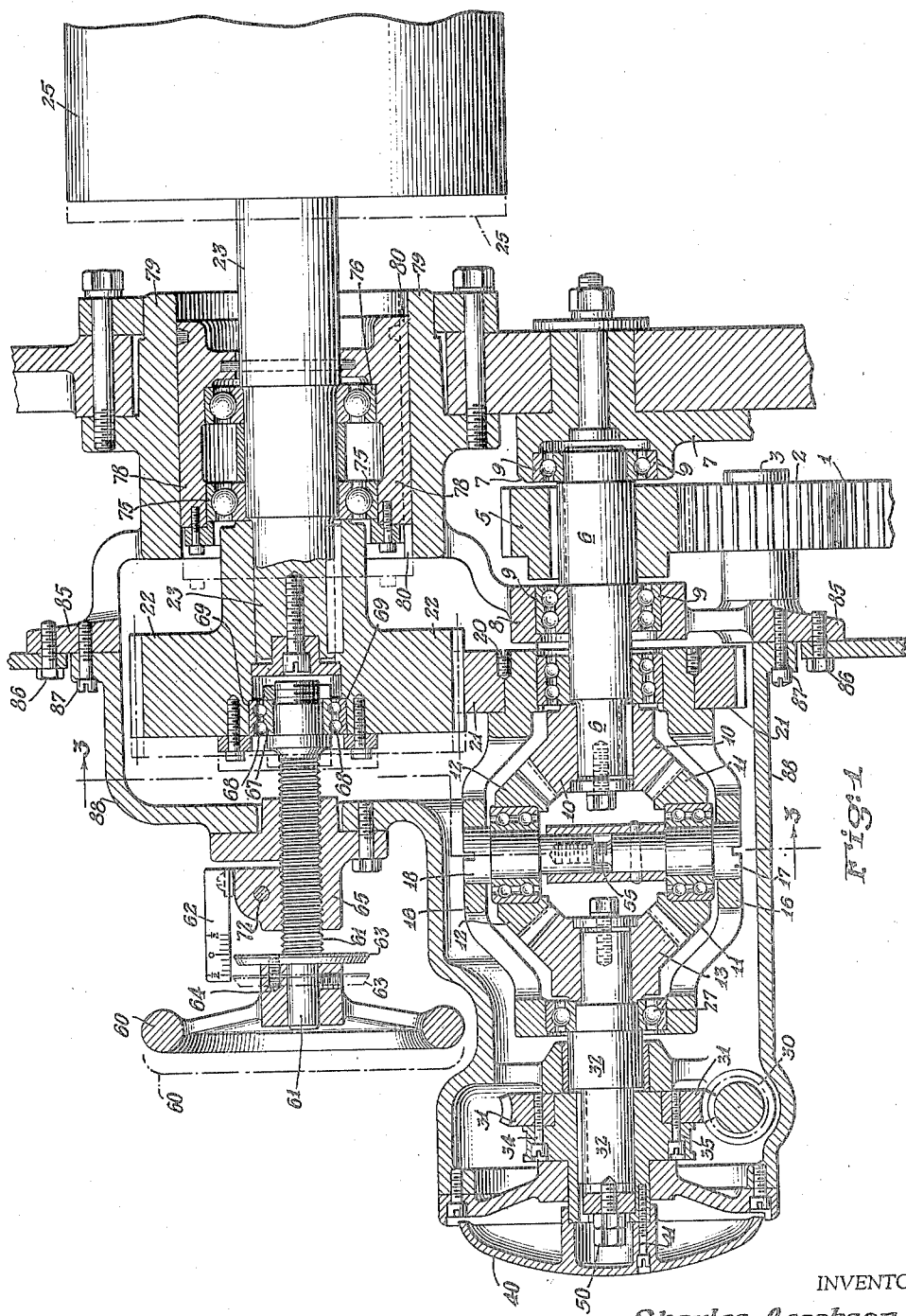


FIG. 1

INVENTOR.

Charles Jacobson

BY

Castrolink, Greene & Merson
his ATTORNEYS

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2 Sheets-Sheet 2

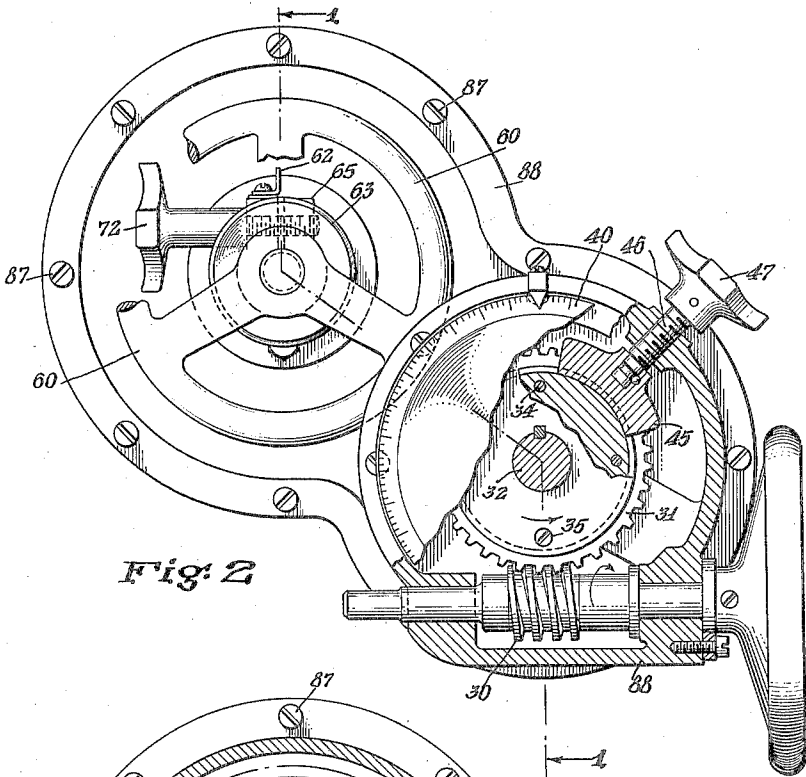


Fig. 2

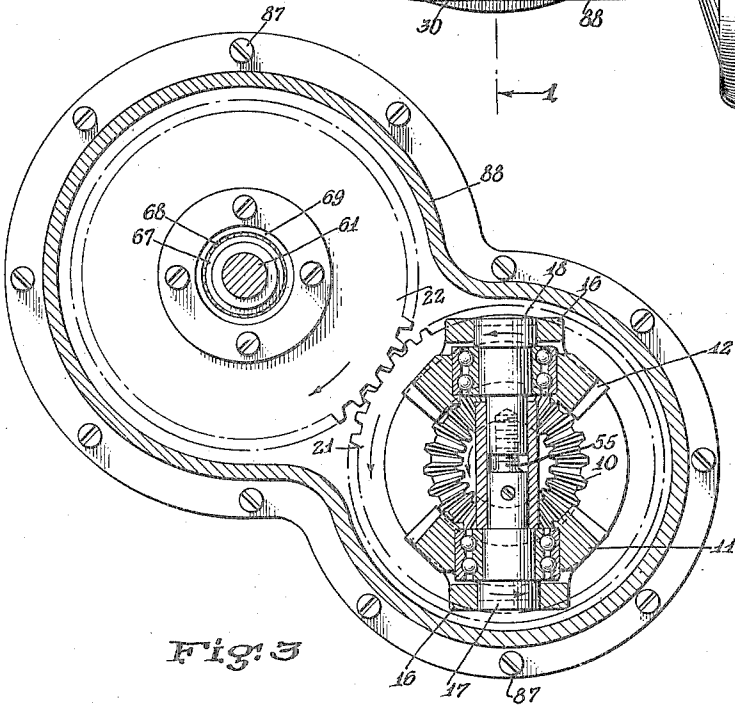


Fig. 3

INVENTOR.
Charles Jacobson
BY *Ostrolenk, Greene & Marsen*
his ATTORNEYS

UNITED STATES PATENT OFFICE

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MITER GEAR ADJUSTMENT FOR RUNNING REGISTER

Charles Jacobson, New York, N. Y., assignor to
S & S Corrugated Paper Machinery Company,
Inc., Brooklyn, N. Y., a corporation of New York

Application July 30, 1938, Serial No. 222,166

5 Claims. (Cl. 74—395)

My invention relates to a means for effecting a running register adjustment and more specifically it relates to machines for use in the treatment of advancing sheet material by means of operating mechanisms which must be relatively adjusted so that a desired registry of operations on the sheet is obtained.

In machines for multi-colored printing, slotting and similar operations it is necessary that a complete accuracy be obtained between different correlated parts or dies that operate in conjunction with one another upon material to be printed or colored. In addition to operations that involve multi-colored or colored printing, this accuracy is further a primary requisite in those operations which entail printing in conjunction with slotting or any similar operations.

The primary essential of machines for making adjustments in operations of this kind is that the adjustment be made without interrupting the constant movement of the machine and also that the adjustment be made without interrupting the main power line from the power source to the operating part.

It has been suggested to effect the peripheral adjustment of operating mechanisms of this nature by moving the gear train circumferentially about the axis of the power shaft. By means of this axial movement of the gears in the power line to the main shaft a certain progression or retrogression of the operating drum can be effected. There are manifest difficulties attendant upon this manner of adjustment however.

In gear movements of this nature there is too much opportunity for back lash or uncompensated movement between the engaging teeth of the respective gears. This tends to disturb the accuracy of the adjustment and operation of the mechanism.

This and other practical difficulties encountered with this type of mechanism have led me to the apparatus of the present invention. I have, therefore, devised an apparatus in which, without interrupting the power drive of the mechanism, the peripheral adjustment of the operating drum is effected by means of an adjustable planetary miter gear arrangement which is fixedly located with respect to the operating mechanisms. In brief my adjustments are effected not through any axial movement of the gear trains but by an internal adjustment thereof.

By means of my apparatus I can secure positive and accurate registry of operating mechanisms during the running operations of my apparatus. I achieve this registry by imposing be-

tween the power source and the shaft of my operating drum a gear train by means of which a predetermined advancing or retarding movement may be imparted to effect a desired registry of the operating drum of my apparatus. This differential may be effected in a variety of ways, but I prefer to effect it by employing a miter gear arrangement which will be more specifically described hereinafter.

In addition to obtaining a peripheral adjustment of my operating mechanism, I further can secure lateral adjustment, which is equally important with regard to the actual operation of the apparatus, by effecting a positive lateral shift of the main shaft to which the operating drum is rigidly attached, the shift as indicated being in a lateral direction and rigidly controlled.

It is, therefore, an object of my invention to provide means for securing peripheral adjustment of a drum mechanism in running registry by means of a fixed gear drive.

It is another object of my invention to provide for peripheral adjustment of a drum in running registry without the necessity for axial movement of the gear train which rotates the drum.

It is still another object of my invention to provide a planetary gear system for effecting a peripheral adjustment of an operating drum in running registry.

It is a further object of my invention to provide a miter gear arrangement whereby a peripheral adjustment of an operating drum may be effected in running registry.

It is still a further object of my invention to provide a controlled lateral adjustment for an operating drum in running registry.

It is still a further object of my invention to provide for a conjoint peripheral and lateral adjustment of an operating drum in running registry.

These and other objects of my invention will become apparent from the description hereinafter set forth.

Referring now to the drawings, Figure 1 is a side cross-sectional view on line 1—1 of Figure 2 of my apparatus with the drum and shaft in partial elevation.

Figure 2 is a front view of the apparatus of my invention partially in section.

Figure 3 is a section along the line 3—3 of Figure 1.

Referring now more specifically to the drawings, in Figure 1 I show a gear 1 driven by a suitable power source. In mesh with the main power gear 1 is an idler gear 2 mounted on a

stud 3. In mesh with the gear 2 is a gear 5 mounted on a shaft 6. Shaft 6 is mounted in bearing brackets 7 and 8 by means of ball bearings 9. The gear 5 is fixedly mounted on the shaft 6 and transmits power supplied to it by the idler gear 2 so that the miter gear 10 is fixedly rotated with the shaft 6. The miter gear 10 revolving, rotates the meshed gears 11 and 12. The gears 11 and 12 ride in contact with the normally stationary miter gear 13. Because of this drive of the miter gears 11 and 12 by the miter gear 10, the axes of these miter gears 11 and 12 are rotated in a plane perpendicular to that of gear 10 thus causing the rotation of the housing 16 which is imparted through the studs 17 and 18 of the gears 11 and 12 respectively. Fixedly mounted by means of the key screw 20 on the housing 16 is a gear 21 which cooperates with the gear 22 mounted on the shaft 23. The shaft 23 is identical with the shaft which operates the operating mechanism represented by the drum 25. Thus we have traced the main power line which gives to the operating mechanism its operating power.

It is the object of my invention to provide differential adjustment in the rotation of the operating drum 25 without interference with the normal continuous movement of the drum and I accomplish this in the manner to be set forth.

By means of the worm 30 I operate the worm gear 31 to give it a rotary movement which is then transmitted to the shaft 32 to which the worm gear 31 is fixedly mounted by means of the bolts 34 and 35. By thus rotating the shaft 32 on the ball bearings 27 set into the housing 16, I can rotate the normally stationary miter gear 13. This rotation of the miter gear 13 is transmitted to the miter gears 11 and 12 and causes either an advancing or retarding of the rotation of the housing 16 that is effected by the movement of these miter gears 11 and 12. Thus by a slight and positive movement of the normally stationary miter gear 13 I advance or retard the movement of the operating drum 25 inasmuch as there is an advancement of the gear train through the power source effected by this adjustment of the normally stationary miter gear 13.

In clarification of this point it is to be noted that in the normal operation of the drum there is a fixed and continuous drive through the power gear starting from the source 1 to the miter gear 10 and hence to the coacting miter gears 11 and 12 through the studs 17 and 18 and the housing 16 and the fixed gear 21 to the gear 22 which is fixedly mounted on the shaft which is to be rotated. When the rotation of this shaft and the drum 25 is to be advanced or retarded a short distance, it is effected by advancing or retarding the movement of the studs 17 and 18 which are carried by the miter gears 11 and 12. The advancing or retarding is carried out by moving angularly the normally stationary miter gear 13. A movement forward of this gear advances the studs 17 and 18 a corresponding distance, and a movement backward of this gear retards the movement of the studs 17 and 18 for a corresponding distance. When the proper adjustment is made the miter gear 13 is again in its fixed position and the normal run of the power line is uninterrupted.

Explaining now in detail the method and apparatus for the adjustment of the normally fixed miter gear 13 it can be seen that the dial 40 is in fixed relation with the worm gear 31 by means of its being secured thereto by the bolt 41 and

by its rotation in positive conjunction with the gear 31 indicates directly the adjustment of the movement of printing cylinder 25. Thus the position of the dial as shown in Figure 2 is indicative of the position of the fixed miter gear 13 and a relative movement of the miter gear 13 effects a relative movement of the dial 40. Thus the operator can by means of a predetermined change effect a predetermined corresponding peripheral advancement or retarding of the operating drum 25.

Because it is necessary in apparatus of this nature to inhibit within all reasonable possibility any extraneous movements of the gear mechanism or power chain, I provide a braking mechanism exemplified by the brake shoe 45, as shown in Figure 2, controlled by the rotating screw mechanism 46 actuated by the turn screw 47. Thus, when I effect the proper adjustment by means of the worm 30 on to the worm gear 31 by rotating the screw handle 47 I frictionally clamp in proper positive position the brake shoe 45 on to the gear 31.

I have further found it necessary to provide certain adjustments for taking up the back lash in the gear train of my apparatus. This is to provide a positive intermesh of all mechanisms without leeway to provide a variable movement which is finally transmitted to the operating mechanism, which, as has been pointed out, is provided with no leeway but must have an accurate predetermined position at all times. The back lash is inhibited from taking up any free movement by means of the set screws 50 which provide for the taking up of the lateral back lash in the miter gear arrangement, and the cooperating studs 17 and 18 which are caused to approach each other by means of the screw engagement thereof represented at 55.

In addition to having a peripheral adjustment such as has been set forth and described, I provide by means of my apparatus a novel lateral adjustment as shown in the upper flight of Figure 1. The lateral adjustment is initiated by the manipulation of the wheel 60 which is fixedly mounted on the screw 61. The lateral movement of the screw as actuated by the wheel is indicated on the dial 62 by the disc 63 which is fixed on to the screw 61 by the bolt 64. The movement of the wheel 60 actuates the lateral movement of the screw 61 in the split bearing 65. The screw 61 terminates in an inner race 67 carrying ball bearings 68. The lateral movement of the screw 61 is transmitted through the inner race 67, through the balls 68 and thence to the outer race 69 which is fixedly mounted on the gear 22.

Thus, rotation of the wheel 60 effects a lateral movement of the screw 61 which transmitted through the ball bearings 68 effects a lateral movement of the gear 22 and the rigidly attached shaft 23 on which is mounted rigidly the operating drum 25. The shaft 23 rotates in the ball bearings 75 and 76, and the ball bearings are mounted in the sleeve 78 which moves laterally as indicated by the dotted line position in the housing 79. The sleeve 76 is keyed into the housing 79 by the key 80 to prevent rotary motion of the sleeve 76 and allow only the desired lateral motion.

After the proper lateral positioning of the operating drum 25 has been effected on the mechanism just described, the lateral positioning is positively set by a brake mechanism which comprises a knob 72, which, by means of the screw

movement, clamps the split bearing 65 and fixedly sets the screw 61 in its predetermined position.

Fixed to the housing 79 and extending therefrom is a housing member 85 which is fixed by the bolts 86 and 87 to a housing member 88 attached to the split member 65. Similar housing members extend about the gear mechanisms in the power line of this apparatus.

Thus by the apparatus such as has been particularly described, I can obtain an accurate predetermined peripheral and lateral adjustment of the operating drum while this drum is in running registry. The mechanism of my invention eliminates the difficulties of the mechanisms of the prior art and provides new and unexpected results in that it maintains extreme accuracy in operation and provides for extreme accuracy of adjustment.

It is understood that numerous minor changes may be made in the apparatus of my invention without departing from the spirit of the invention and it is intended that the patent shall cover by suitable expressions in the appended claims whatever features of patentable novelty reside in the invention.

I claim:

1. A running adjustment means for a driven shaft adapted to be rotated by a gear comprising a driving connection between said gear and said shaft, and means for advancing or retarding said shaft without axial displacement in the driving connection comprising a normally rotating miter gear and a normally stationary miter gear and gears positioned between said normally rotating miter gear and said normally stationary miter gear and in engagement therewith, said gears in engagement with said miter gears revolving about studs, said studs being moved in a rotary path by the engagement of the gears with said normally stationary and said rotating miter gear; and a housing surrounding said miter gears and said intermeshed gears carrying said studs, said studs engaging said housing, and means for rotating said normally stationary miter gear for advancing or retarding said gears on said studs and for advancing or retarding said shaft.

2. A running adjustment means for a driven shaft adapted to be rotated by a gear comprising a driving connection between said gear and said shaft, and means for advancing or retarding said shaft without axial displacement in the driving connection comprising a normally rotating miter gear and a normally stationary miter gear and gears positioned between said normally rotating miter gear and said normally stationary miter gear and in engagement therewith, said gears in engagement with said miter gears revolving about studs, said studs being moved in a rotary path by the engagement of the gears with said normally stationary and said rotating miter gear; and a housing, said housing carrying said first mentioned gear, said driving connection being provided by said first mentioned gear engaging another gear fixedly mounted on said driven shaft.

3. A running adjustment means for a driven

shaft adapted to be rotated by a gear comprising a driving connection between said gear and said shaft, and means for advancing or retarding said shaft without axial displacement in the driving connection comprising a normally rotating miter gear and a normally stationary miter gear and gears positioned between said normally rotating miter gear and said normally stationary miter gear and in engagement therewith, said gears in engagement with said miter gears revolving about studs, said studs being moved in a rotary path by the engagement of the gears with said normally stationary and said rotating miter gear; and a housing, said studs engaging said housing, said housing carrying said first mentioned gear, said driving connection being provided by said first mentioned gear engaging another gear fixedly mounted on said driven shaft.

4. A running adjustment means for a driven shaft adapted to be rotated by a gear comprising a driving connection between said gear and said shaft, and means for advancing or retarding said shaft without axial displacement in the driving connection comprising a normally rotating miter gear and a normally stationary miter gear and gears positioned between said normally rotating miter gear and said normally stationary miter gear and in engagement therewith, said gears in engagement with said miter gears revolving about studs, said studs being moved in a rotary path by the engagement of the gears with said normally stationary and said rotating miter gear; a housing surrounding said miter gears and said intermeshed gears carrying said studs, said studs engaging said housing; and means for rotating said normally stationary miter gear for advancing or retarding said gears on said studs, said means comprising the mounting of said normally stationary miter gear upon a shaft, and means for rotating said latter shaft.

5. A running adjustment means for a driven shaft adapted to be rotated by a gear comprising a driving connection between said gear and said shaft, and means for advancing or retarding said shaft without axial displacement in the driving connection comprising a normally rotating miter gear and a normally stationary miter gear and gears positioned between said normally rotating miter gear and said normally stationary miter gear and in engagement therewith, said gears in engagement with said miter gears revolving about studs, said studs being moved in a rotary path by the engagement of the gears with said normally stationary and said rotating miter gear; a housing surrounding said miter gears and said intermeshed gears carrying said studs, said studs engaging said housing; and means for rotating said normally stationary miter gear for advancing or retarding said gears on said studs, said means comprising a rotatable shaft, said normally stationary miter gear being mounted on said latter shaft, said latter shaft carrying another gear, and means meshing with said additional gear for rotating said latter shaft.

CHARLES JACOBSON.