Oct. 21, 1941. T. S. FITCHETT 2,259,441

PRINTER SLOTTER ROLL ADJUSTMENT

Filed May 31, 1940 2 Sheets-Sheet 1

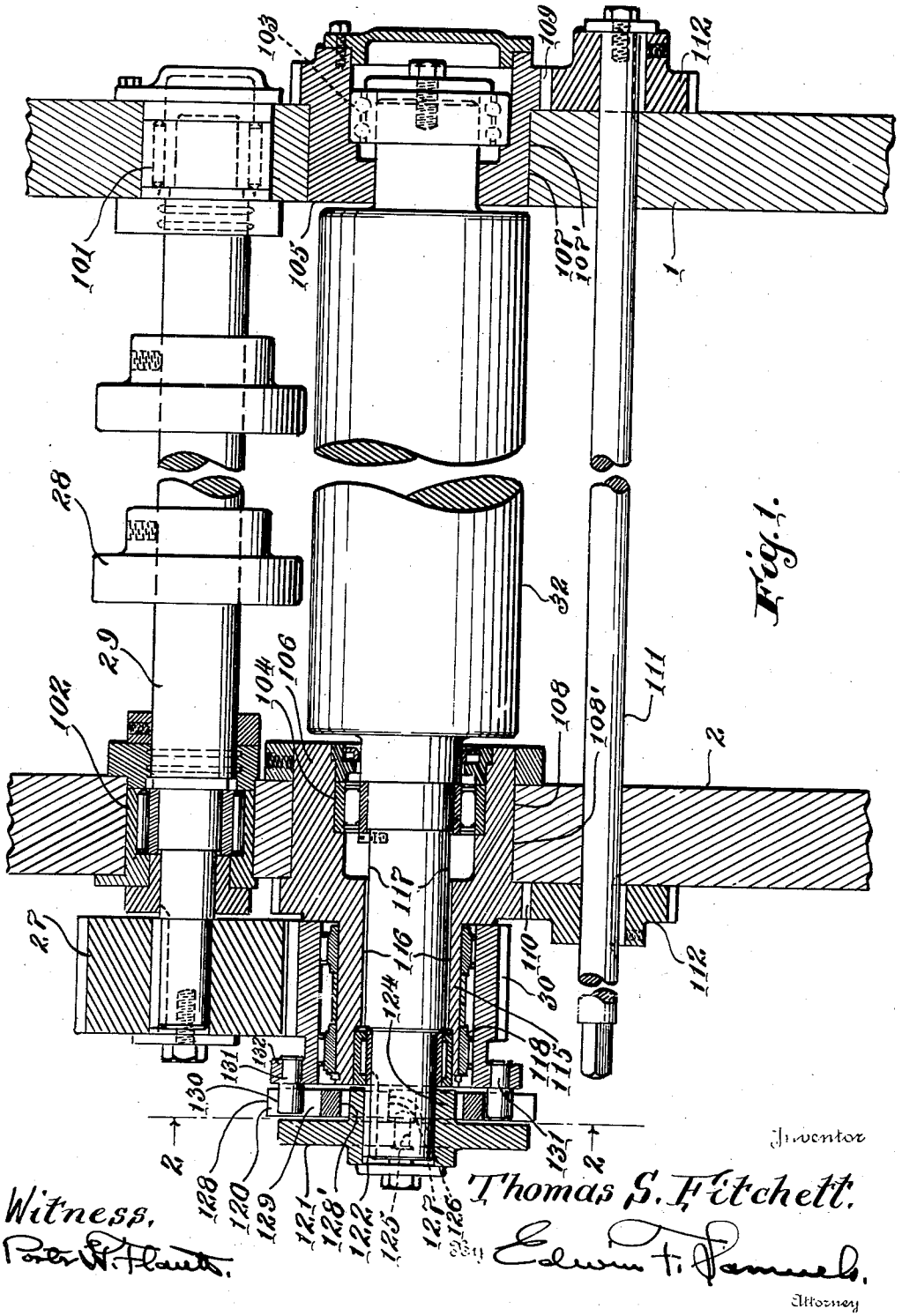


Fig. 1.

Witness,
Peter W. Flaherty.

Inventor
Thomas S. Fitchett.
By Edwin T. Samuels.
Attorney

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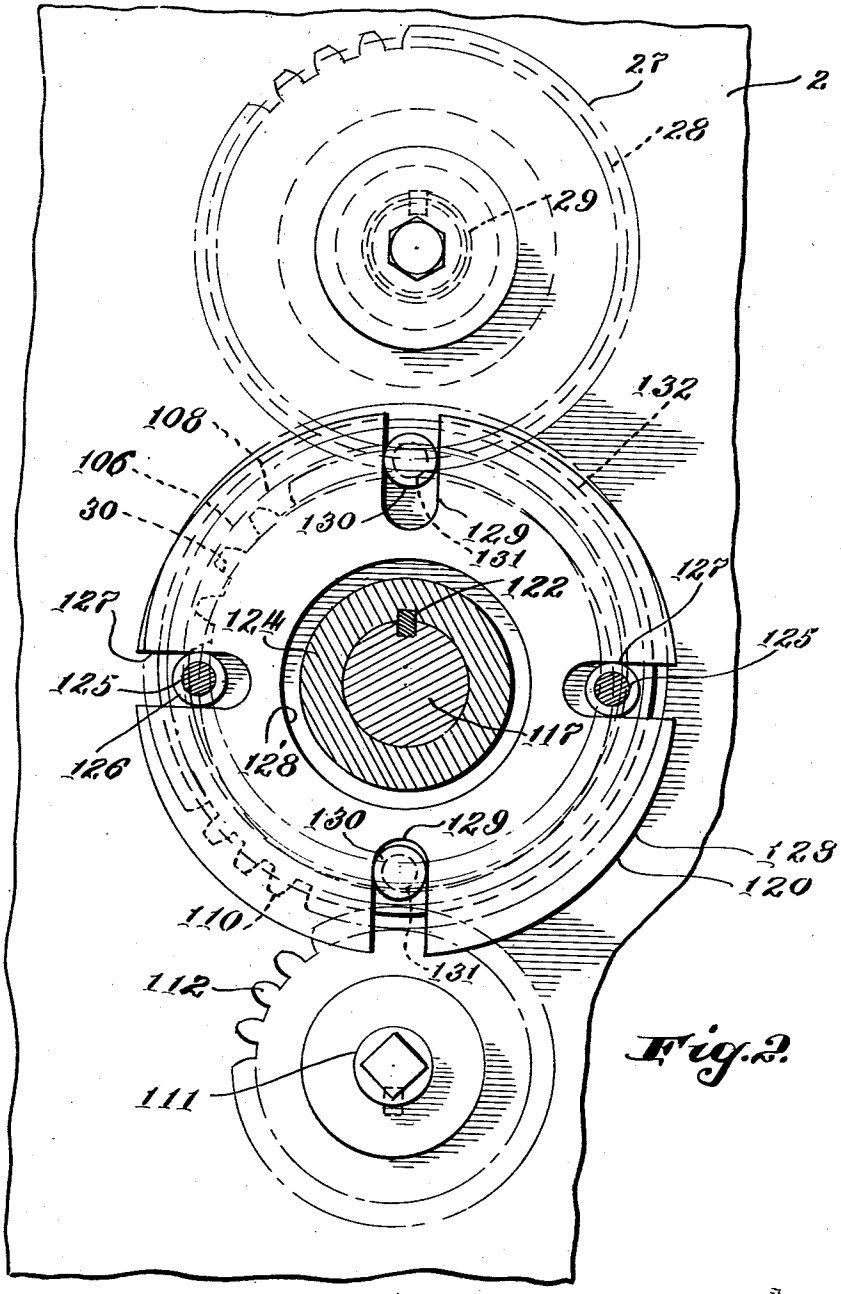


Fig. 2.

Inventor

Thomas S. Fitchett.

Witness,

By Edwin F. Samuels

Attorney

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UNITED STATES PATENT OFFICE

2,259,441

PRINTER SLOTTER ROLL ADJUSTMENT

Thomas S. Fitchett, Glen Arm, Md., assignor to F. X. Hooper Company, Inc., Glen Arm, Md., a corporation of Maryland

Application May 31, 1940, Serial No. 338,146

4 Claims. (Cl. 101—216)

This invention relates to printer slotters used for printing and slotting carton blanks, the same being in the nature of an improvement on the Roll shaft adjustment described and claimed in United States Patent No. 2,191,988, granted to F. X. Hooper Company, Inc., on the application of Henry B. Greenwood.

In response to the demand for machines of increased capacity, the operating speeds have been extensively increased and for the same reason the number of blanks supported on the machine for feeding and hence the weight of the pile of blanks supported at the feed end has been likewise increased. These blanks, before they reach this machine, are cut to the desired length, and they are fed to the rollers of the printer slotter by a reciprocating feed which is mounted on the printer slotter frame and on account of the high speeds now employed, it reciprocates at a correspondingly high speed imparting to each blank an acceleration from zero to approximately one thousand feed per minute, this acceleration being necessary to raise the speed of the blanks to the surface speed of the rolls.

The reciprocating feed in accordance with the present practice operates at a speed of approximately five hundred strokes per minute and the resulting vibration is of a destructive nature. Also the pressure rolls operate at correspondingly high speeds and pressures adding to the stresses to which the metal frames are subjected.

On account of the practice of using in the boxes and similar products made on these machines, corrugated board of various thicknesses, it is necessary to provide an adjustment of the pressure rolls to accommodate them to the different thicknesses of board. Up to the present time, the bearings of the rolls have been supported in sliding blocks which ride in slots in the frames, but this slotting of the frames has been found to remove so much of the material essential to the support of the rollers that the remaining portion of the frame are necessarily of excessive thickness and weight to give them adequate strength to resist the stresses above mentioned and the frames are not only very heavy but correspondingly expensive. Even with this excess thickness and weight of the frames, failure due to roll pressure and vibration cannot always be avoided.

An important object of the present invention is to provide for the adjustment of the roll to accommodate the machine to different thicknesses of material and at the same time to avoid the slotting of the frame which is incident to the adjustment of the bearings according to the previous practice and to do this to better advantage than in the patent above cited.

While eccentric adjustments have been used for this purpose, i. e., one roll together with its driving gear being moved eccentrically relatively to the other, there has been great difficulty with this arrangement on account of the shifting of the line of contact of the gears which results in a grinding noise due to excess friction. This friction results in loss of power and also tends to reduce the life of the gears and there is further objection to the noise which tires the workers and interferes with the efficiency of shop operation.

While the invention of the previous patent above cited provides for the shifting of the rollers in the adjustment of the machine to different thicknesses of material, avoiding the slotting of the frame and shifting of gears relatively to each other, avoiding the change of contact with the consequent friction and grinding action, the construction disclosed in the previous patent has the disadvantage that a separate support for the gears connecting the pressure rollers whereby one is driven from the other has been found necessary thus increasing the width of the machine and adding to the complication and increasing the number of parts and involving a tendency to failure and change of the contact line or pitch line of the intermeshing gears.

The present invention relates to an improved adjustment whereby the improved result above outlined is obtained, the additional outside support for the gears being eliminated, thus greatly simplifying the construction and reducing the overall width of the machine and economizing space without in any way reducing the length of the roll or the capacity of the machine.

As the printer slotter construction to which the adjustment of the present application has been applied corresponds directly to that shown in Fig. 1, Patent No. 2,191,988, further illustration of the machine as assembled is considered unnecessary as such assembly drawing would be identical with said Fig. 1, the roll adjustment of the present application being applied to the same rolls to which the adjustment of the said previous patent is applied. The present adjustment may also be applied to whatever rollers in this type or other types of printer slotters may require adjustment transversely to their axis, i. e., to vary the grip of the rolls.

An important object of the present invention is to provide for adjustment of the pressure roll

to accommodate the machine to different thicknesses of material avoiding the necessity for a support for each driving gear thus adjusted, as disclosed in the said patent, thus reducing the width of the machine as shown in that patent, and likewise its degree of complication, the number of parts and tendency to failure.

The invention further provides for the adjustment of both ends of one roller of each pair uniformly and simultaneously. Accurate timing is one of the most important conditions to be maintained in the operation of a printer slotter because the exact depth of slot and the matching of the colors in printing is essential to a satisfactory product. The device of this invention keeps the gears permanently in perfect mesh and is the only arrangement of gearing which maintains this relation of the gears so that the gears always turn on a true pitch line and for this reason have no back lash or lost motion which would interfere with accurate timing. It is an important advantage of the present construction that a uniform angular relation of the rolls to and with the gears by which they are driven is maintained even though the centers of the rolls are shifted relatively to these gears in making the adjustment. Thus the uniform speed of the drive being maintained, the uniform angular speed of the rollers is likewise maintained, this being a condition which is essential to satisfactory operation of the machine.

In the accompanying drawings, I have illustrated a machine embodying the invention in the preferred form.

In the drawings:

Fig. 1 is a vertical section through the axes of one pair of pressure rollers, showing the rollers in elevation and the bearings and adjustment features in section.

Fig. 2 is an elevation looking to the right from the line 2—2 in Fig. 1, the driving connection from the gear to the lower roll shaft being shown in section on said line.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts the different figures, the construction shown comprises right and left side frames 1 and 2 also upper pull rolls 28 mounted on a shaft 29 and lower roller 32 on shaft 117, the shaft 29 having secured thereto the gear 27 which may be driven from the printer cylinder gear as in the previous instance. This gear 27 on the shaft of the upper pull roller meshes with and drives a gear 30, having a driving connection to the lower roller 32 in a manner to be described.

In the form of the invention shown, the shaft 29 of the upper roller is mounted in suitable bearings 101, 102 in the side frames 1 and 2 respectively, and the bearings 103, 104 for the shaft 117 of the lower adjustable roller 32 are mounted in rotatable disc like carriers or eccentrics 105 and 106 which fit rather closely in circular bearings 107, 108 in the side frames 1 and 2 respectively. The bearings 103 and 104 are eccentrically mounted in said carriers 105 and 106 in order that the rotation of the said carriers in their respective bearings may provide for adjustment of the roll 32 to and from the roll 28. Thus slotting of the frames is avoided and the full strength of the frame maintained with a relatively reduced weight of material as compared to the previous arrangements which provide adjustment of the rolls by means of slots as above defined.

The eccentrics or carriers 105 and 106 are provided with gear teeth 109, 110 and there is an adjusting shaft 111 mounted in the frame below the roll 32 or in any convenient position, said adjusting shaft 111 being provided with pinions 112 secured thereto and having teeth meshing with the gear teeth 109, 110 on the respective carriers 105, 106 whereby these carriers or eccentrics may be turned uniformly, giving a uniform and equal adjustment of the respective ends of the roll 32 or more particularly of bearings 103, 104 at the respective ends thereof, thus maintaining the roll grip uniform throughout the length of each pair of rolls, one of which is thus adjusted.

An important feature of the invention resides in the provision on the eccentric carrier 106 of an integral rigid bearing support 115 which is apertured longitudinally at 116 to receive and admit the end of shaft 117 of the roll 32 which turns freely therein, said bearing support 115 being concentric with the bearings 107 and 108 in the frames 1 and 2 and with the outer surfaces 107' 108' of said eccentrics 105, 106 so that the position of the support 115 is constant and said support merely rotates about its axis when the roll 32 is adjusted the latter being shifted transversely to its axis. This support 115 in the form shown carries an anti-friction bearing 118 for the pressure roll drive gear 30 which gear rotates freely thereon. While there may be some variation in the position of support 115 the bearing 118 is essentially concentric with the axis of carriers 105 and 106. The bearing of the gear 30 being concentric with said axis is not shifted transversely to its axis and maintains its position throughout the adjustment, affording a stationary bearing for the gear when the roll adjustment is operated, and at all times.

The roll drive gear 30 is connected to the shaft end 117 of said gear in any suitable manner as by the floating coupling 120 to be described.

This coupling, as shown, comprises a disc 121 at the extreme left in Fig. 1 and rigidly secured to the end of the shaft 117 in any suitable manner as by means of a key 122, and this disc 121, which has an extended hub portion 124, to provide sufficient seating surface for the key is provided with pins 125 projecting to the right, i. e., toward the roller 32 in Fig. 1 and parallel to its axis and the pins may be provided with anti-friction rollers 126. These rollers engage opposite slots 127 of radial tendency located in a floating disc 128. This disc is apertured at its center at 128' to encircle the hub 124 and is also provided with opposite radial slots 129 at right angles to the slots 127. These slots engage rollers 130 or are otherwise engaged with correspondingly placed pins 131 seated in a disc or flange 132 integral with the hub of and spaced outwardly from the toothed portion of, the gear 30. It being understood in this connection that the center line of the opposite slots 127 is at right angles to the center line of opposite slots 129, both these lines extend through or near the axis of the roll shaft 127. Thus the motion of the gear 30 is communicated to the shaft 117 and to the roller 32 and suitable support for the bearings of the gear 30 is provided integral with the eccentric carrier 106 whereby the necessity for a separate support for said gear or its bearings as in the previous construction is avoided.

Important accomplishments of the invention are that the construction is made much more rigid and less liable to failure, and it is also

simplified so that it can be built and assembled at a smaller cost and the overall dimension of the machine as measured parallel to the axis of the rolls is considerably reduced.

It should be understood that this adjustment is intended to be applied to all of the various rollers to which the corresponding adjustment in the above cited patent is applied as shown in said patent and to other rolls in this and similar machines.

It is important to note that as the roll **32** moves up and down in order to accommodate corrugated board of different thicknesses or the like, the position of the gear **30** is not changed and it should also be noted that the angular relation between the roll **32** and the gear **30** is constant and there is no relative shifting of the roll **32** relatively to the roll **28** due to the adjustment, reference being had to relative change of angularity.

Important advantages are increased compactness, simplicity, cheapness, reduced dimension, and reduced liability to failure and consequent reduction of service expense in the operation of the machine.

I have thus described specifically and in detail a single embodiment of my invention in order that the manner of constructing, applying, operating and using the same may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the construction being capable of considerable variation in its application to the purpose in hand, and the scope of the invention is pointed out in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a printer slotter, a pair of co-operating rolls adapted to engage the opposite sides of a sheet to be fed by application of gripping pressure thereto to advance the sheet, one of said rolls having a shaft with bearings therefor at the opposite ends of said roll, a carrier for each said bearing, said carrier being rotatable about an axis which is parallel to but eccentrically located as to the axis of said bearings, a bearing support integral with one rotating carrier and a bearing thereon for a drive gear which bearing is concentric with the axis of said carrier, a drive gear for said roll rotating on the bearing on said support and a floating coupling providing a laterally variable driving connection from said gear to said roll shaft.

2. In a printer slotter having presser rolls and gears driving the respective rolls and bearings at the opposite ends of the rolls, a roll adjustment comprising a rotary eccentric carrier for the bearing at each end of one presser roll in which said bearings are eccentrically mounted and a bearing for the gear driving said latter roll, said gear bearing being mounted on one said carrier concentrically with the axis of the carrier.

3. In a printer slotter having a presser roll said roll being one of a pair of rolls adapted to engage opposite sides of a sheet to be advanced by application of gripping pressure thereto, said presser roll having a shaft and bearings therefor, a driving gear and a coupling providing lateral play, and connecting the gear to the roll, rotary carriers for said bearings, one of said carriers having a bearing support for the driving gear for said roll and a bearing for the gear on said support and concentric with the axis of said carrier, both bearings for the roll being eccentrically mounted in said carriers.

4. In a printer slotter a presser roll having a shaft and bearings therefor, and a driving gear, rotary carriers for said bearings, one of said carriers having a bearing support for the driving gear and a bearing thereon concentric with the axis of said carriers, the bearings for the roll being eccentrically mounted in said carriers, and a coupling providing a driving connection between said gear and said roll shaft, means for adjusting both said carriers simultaneously and equally about their centers to adjust the roll transversely to its axis, said coupling comprising a floating disc, a corresponding disc secured to said shaft on one side of the floating disc and a member rotating with the gear on the other side of the floating disc and pin and slot connections from the member to the floating disc on one side and from the shaft disc to the floating disc on the other side, the slots of one set of connections being at right angles to the slots of the other set of connections.

THOMAS S. FITCHETT.