May 25, 1937. T. S. FITCHETT 2,081,583

ROLL ADJUSTMENT FOR PAPER BOX MACHINES OR THE LIKE

Filed May 4, 1936 3 Sheets-Sheet 1

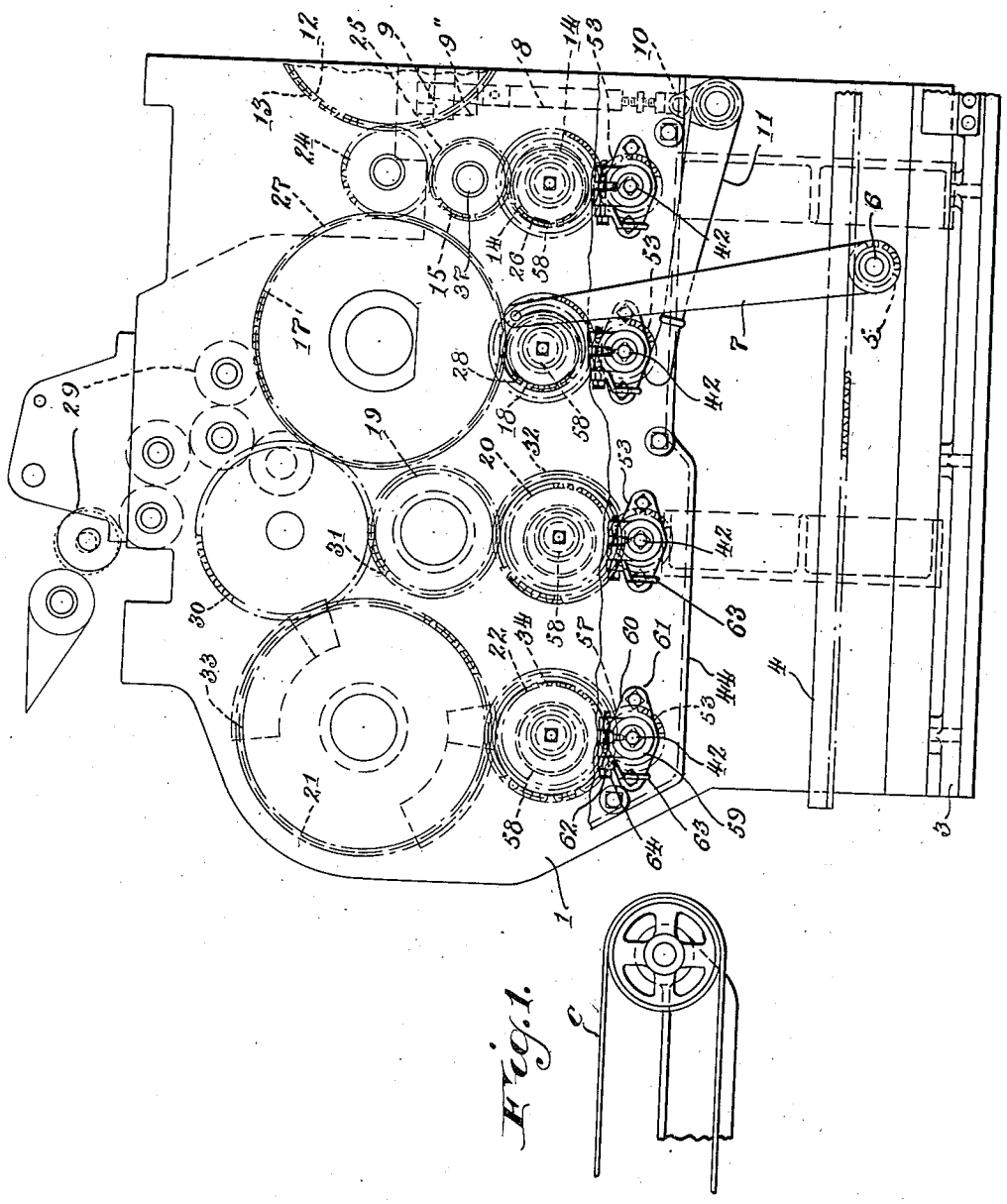


Fig. 1.

Witnesses
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ROLL ADJUSTMENT FOR PAPER BOX MACHINES OR THE LIKE

Filed May 4, 1936 3 Sheets-Sheet 2

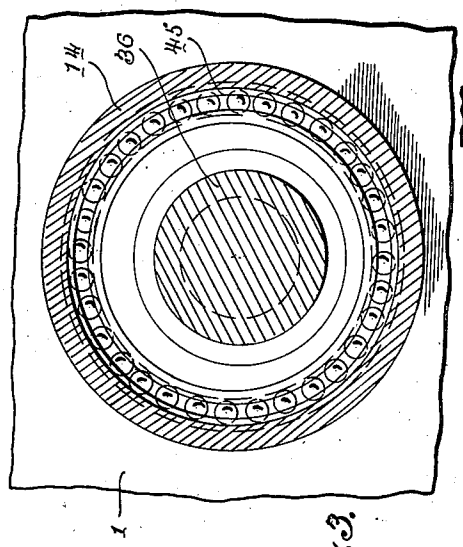


Fig. 3.

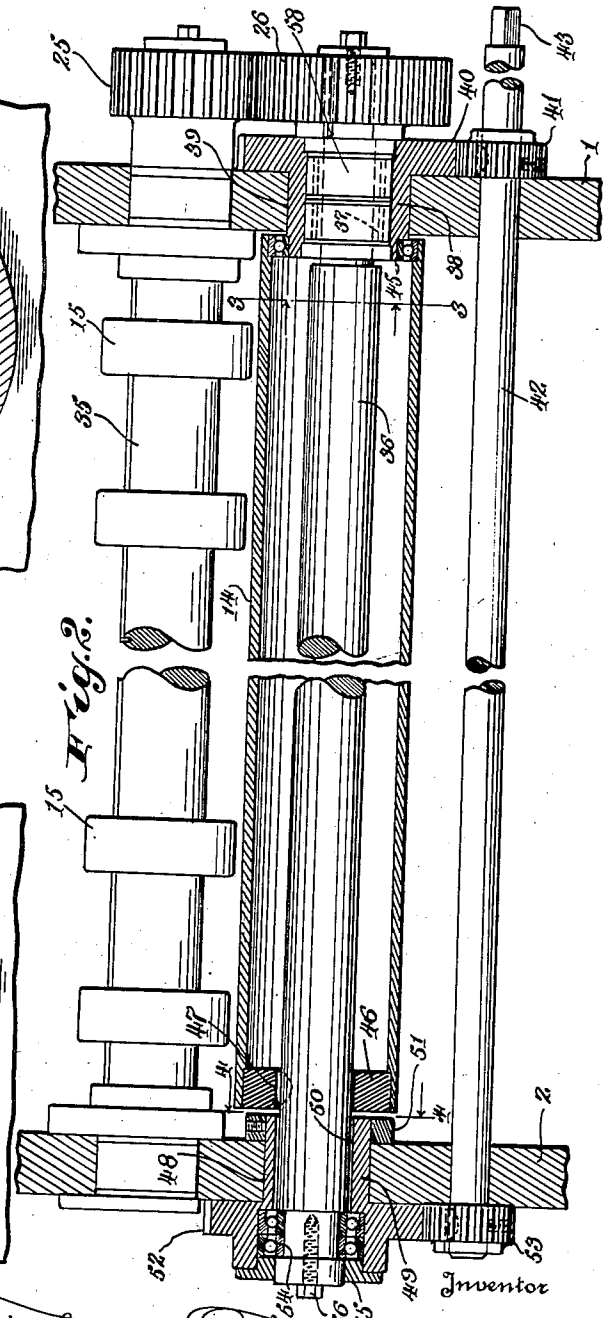


Fig. 2.

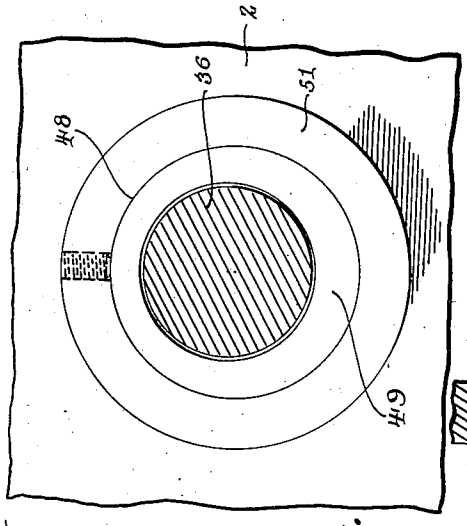


Fig. 4.

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Filed May 4, 1936 3 Sheets-Sheet 3

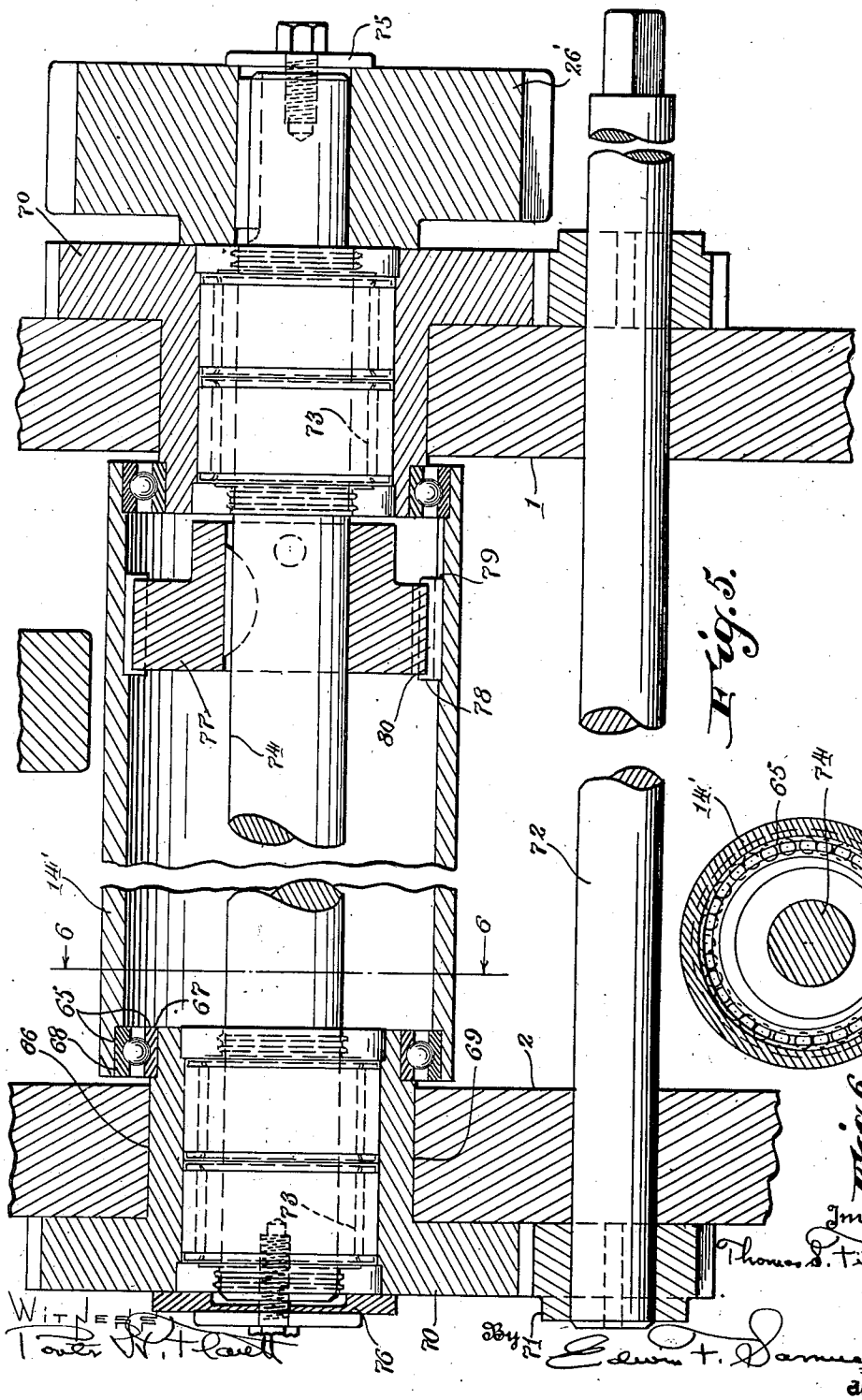


Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE

2,081,583

ROLL ADJUSTMENT FOR PAPER BOX MACHINES OR THE LIKE

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Application May 4, 1936, Serial No. 77,736

8 Claims. (Cl. 93—58.2)

The invention relates to treatment of paper in making carton blanks. For this purpose double faced corrugated board is generally used though the machine is also adapted for use with other varieties of paper box material. The invention has particular reference to the adjustment of the rollers to accommodate paper of different thicknesses.

Due to recent developments in this industry and increased demand, the speed of the machines has been widely increased. In accordance with the present practice, the blanks are fed from a pile which sometimes weighs several hundred pounds and successive feeding of the blanks is accomplished by means of a reciprocating device which at the high speeds now used moves at a speed of approximately 1,000 feet per minute. The vibration due to the rapid reciprocation of the feeding device which is essentially of considerable weight, results in destructive stresses in the frame.

In the machines now in use, the presser rollers and impression cylinders, generally referred to herein for convenience as presser rollers, have been adjusted to accommodate the different thicknesses of paper board by moving their shafts in a vertical direction. The majority of machines are made for the use of corrugated board. The maximum variation between the standard thicknesses of board is about $\frac{3}{16}$'' so that this is the maximum adjustment required with the material. This amounts to $\frac{3}{32}$'' adjustment in each direction from the normal center position. The vertical adjustment of the shafts makes it necessary to provide numerous vertical slots or ways in the frame to accommodate the sliding blocks, carrying the bearings for the shafts thus adjusted. The presence of these numerous slots and/or ways in the side frames results in weakness of the frames which tends to cause them to fail due to the weight supported and the heavy vibration of the machine and the intermittent strain applied to the rollers and hence to the frames by the passing of successive blanks between the rollers under considerable pressure. To compensate for the weakness due to slotting of the frames, these frames were of excessively heavy construction to give the required strength.

Such machines have always been driven from a single source of power which is transmitted from one roller to another through intermediate gears. Usually with the vertical adjustment intermediate gears were mounted on the shafts of the upper and lower rollers and these intermediate gears were geared to other intermediate gears in order to transmit the power to the successive printing and scoring and slotting rollers and to other lower presser rollers, and on vertical adjustment of the presser rollers considerable backlash was present. This has proved harmful, particularly at high speeds.

One of the objects of the invention is to provide for the use of lighter frames which are easier to ship and to handle and less expensive than those which were necessary in the previous machines at the same time permitting the new machines to operate at the increased speeds without placing undue strain on the frame or any of the parts. Another object of the invention is to eliminate a number of these intermediate gears so that at the increased speed there may be less backlash between the various gears and between the rollers. Other advantages and objects of the invention will be more fully brought out in the description of the machine in connection with the drawings. A copending application, No. 57,508, by the present applicant, contains a full description and illustration of a printer slotter. This prior application describes an eccentric adjustment of the presser roller shafts which involves an eccentric motion of the toothed driving gears on these shafts.

The present invention relates particularly to an adjustment of the rollers without throwing the roller shafts or the drive gears thereon off center or moving them from their normal driving position. While the invention is shown in connection with a printer slotter, it may be used to advantage in any machine for handling paper board or the like of different thicknesses, more particularly in making boxes, box blanks and other containers.

In the drawings:

Figure 1 is a side elevation illustrating fragmentarily so much of a printer slotter as is believed to be necessary to a full understanding of the features of the invention, particularly the new adjustment of the presser rollers.

Figure 2 is a vertical section on the axis of an adjustable presser roller, the upper roller and the gears being shown in elevation, the roller shown being a pull roller.

Figure 3 is a section on the line **3, 3** in Figure 3 looking in the direction of the arrows and showing the eccentric adjustment at one end of the roller.

Figure 4 is a section on the line **4, 4** looking in the direction of the arrows and showing the eccentric adjustment of the shaft and roller at the other end of the roller.

Figure 5 is a view similar to Figure 2 illustrating a modified form of adjustment.

Figure 6 is a section on the line **6, 6** in Figure 5, looking in the direction of the arrows and showing the eccentric roll adjustment at one end of the roll, the adjustment at the other end of the roll in this instance being similar.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the machine as shown comprises side frames **1** and **2**, which are similar to those shown in the previous application. They

support the shafts and rollers in a manner of arrangement similar to that shown in the previous application except as to the adjustment of the presser rollers, which in combination with the other parts and in detail is the subject of the present invention.

The side frames 1 and 2 are mounted on a base 3, the sections of the frames 1 and 2 at the delivery end shown in the present application being secured to the base. The feeding end sections of said frames, not shown, are preferably slidable as illustrated and described in the previous application. However, this motion of the front section of the frame and the division of the frame into sections is not material to the present invention. The front sections, not shown, are adjusted along the base 3 by means of a longitudinally moving rack 4 engaged by a pinion 5 mounted on a shaft 6 which rotates in suitable bearings in the frame, the pinion 5 being operated by a hand lever 7 to move the front section.

The sections are locked in operative relation by means of a vertically sliding bolt 8 which engages registering apertures in overlapping lugs 9, 9' on the respective frame sections, the bolt being operated by a crank 10 energized by hand lever 11.

The drawings, Figure 1, show a fragment of front printing cylinder 12 driven by a toothed gear 13 concentric therewith and secured to the roller or its shaft, not shown, which is mounted in bearings in the front frame sections. The frame sections 1, 2, carry upper and lower pull rollers 15, 14, the lower pull roller 14 being referred to in a general way as a presser roller. All the rollers have, in fact, a pressing action and all may be made adjustable though it is more convenient to adjust the lower rollers. Side frames 1, 2 also carry printing roller 17 which cooperates with a presser roller 18 located beneath the printing roller. The side frames also carry scoring rollers 19 and 20, the latter being the lower roller and referred to in a general way as a presser roller. Rearwardly of the scoring rollers are the slotting rollers 21, 22, the latter being the lower roller and for convenience referred to herein as a presser roller. The pairs of rollers thus catalogued are arranged from the front to the rear of the frames 1 and 2 in the order named, the rearward direction of the machine being the direction of feed. These pairs of rollers all have their corresponding areas of contact in a single horizontal plane so that the paper moves through the machine from front to rear which is from right to left in Figure 1 in a horizontal direction, the blanks being received, printed, scored and slotted successively in the order in which these operations have been named, or any preferred order.

The respective roll shafts and gear shafts are supported at their ends in bearings in the side frames 1 and 2, an exact description except as to the improved adjustment being regarded as nonessential.

The gear 13 which is secured to the printing roller 12 which is driven by means of a motor at the forward end of the machine which also drives the feed. The driving of roller 12 is accomplished through other gears on the respective rollers. Gear 13 meshes with an intermediate gear 24 which drives the upper pull roller 15 meshing the gear 25 secured thereto. This gear in turn meshes with and drives gear 26 secured to the lower pull roller 14 which is also referred to herein as an adjustable presser roller. The gear 24 also meshes with and drives the gear 27 which is secured to the printing roller 17, driving the same. This gear 27 meshes with and drives the gear 28 secured to the presser roller 18 and hence drives said presser roller which cooperates with the printing roller 17. The printing roller 17 is supplied with ink by means of inking rollers 29. The gear 27 secured to printing roll 17 also drives the intermediate gear 30 which meshes with and drives gear 31 secured to the creasing or scoring roller 19. Gear 31 in turn meshes with and drives the gear 32 secured to the presser roller 20, which cooperates with scoring roller 19. Intermediate gear 30 also meshes with a gear 33 secured to the slotting roller 21, which gear 33 drives the slotting roller 21. Gear 33 also meshes with a gear 34 secured to the presser roller 22, which cooperates with slotting roller 21. The bearings of the respective gear shafts and roller shafts and said shafts are shown at one end in Figure 1, but a detailed description thereof is regarded as superfluous.

It will be apparent that the adjustments shown and to be described do not involve weakening of the frame by slotting or otherwise and that they are otherwise possessed of important advantages.

The printed, scored and slotted blanks, as they are discharged from the rollers 12, 14, 15, 17, 18, 19, 20, 21, 22, which operate on the blanks in the order named, are received by the conveyor C by which they are carried to a suitable point of delivery or from which they are moved by the operator.

As already pointed out, the important features of the invention reside in the roll adjustment and in the combination of the same with the elements of the printer slotter, obtaining the improved results which are the objects of the invention, as already pointed out.

Referring now to Figures 2, 3 and 4, the presser roller illustrated and indicated by reference character 14 is also illustrative as to the manner of adjustment, of presser rollers 18, 20, 22, and any and all other rollers in the machine which it may be found desirable to adjust to the thickness of the paper, it being feasible to adjust in this way not only any and all of the presser rollers but any and all of the upper rollers which cooperate therewith, the adjustment illustrated being, however, confined to the lower roller which is the form in which applicant has developed the invention, this being regarded as the preferred form.

The illustration, Figure 2, shows the pull roller 14, or any roller which it is desired to adjust in accordance with the invention, driven in continuous rotation during the operation of the machine by a toothed gear 26 already described. This is secured to the roller shaft 36 to which the roller 14 is connected to be driven by said shaft in a manner to be described. The gear 26 is driven by gear 25 on the shaft 35 of the upper pull roller 15, the adjustment being shown in connection with the lower pull roller or presser roller 14 in Figure 2 for convenience, as already pointed out. The shaft 36 is shown as mounted to rotate in the frame 1 at the right in Figure 2 in a roller or any suitable bearing 37 carried in a tubular housing 38 mounted for rotary operations in bearings 39 in the frame 1 which is suitably apertured to form this bearing. The tubular housing 38 is provided on the outside of the frame with a toothed gear 40 integral therewith or secured thereto and this gear is operated to rotate the bearing by means of a pinion 41 on the pinion shaft 42 also mounted in bearings in the frames and preferably

extending from one frame to the other as does the shaft 36. The shaft 42 has a square end 43 engageable by a wrench or hand crank not shown, the said square end being outside the guard plate or hood 44 shown fragmentarily in Figure 1.

The tubular housing 38 carries on its left end just inside the frame 1 an external ball or other suitable bearing 45 for the adjacent end of the roller 14 on which bearing the roller 14 rotates. This ball bearing is eccentric as to the center of the tubular bearing housing 38, the amount of eccentricity being in the present instance preferably about $\frac{3}{32}$'' to provide this amount of adjustment on each side of a normal center position, i. e., a total adjustment of $\frac{3}{16}$'' which is the difference in thickness between the maximum and minimum standard thicknesses of corrugated board, which is the material for treatment of which the machines are most frequently adapted and most extensively used.

The length of the roller 14 and all of the rollers described is in this type of machine in accordance with standard practice about 110''. The shaft 36 preferably extends the full length of the roller and through each side frame, this roller 14 and all of the presser rollers being preferably hollow or tubular, or having a bore of sufficient diameter to provide a slight rocking motion of the shaft 36 relatively to the roller, the rocking motion taking place about an axis transverse to the roller axis.

In the form shown the roller 14 is provided preferably at or near its left end or end remote from the bearing 45 with an internal disk or hub 46 or an equivalent member seated in any suitable manner within the roller. This member 46 is keyed at 47 to the shaft 36 in such manner as to provide for a slight rocking of the shaft 36 in this instance a swing relatively to the roller, or vice versa, about an axis transverse to the shaft. The length of the roller is preferably about 110'' and the arc of swing at the end of the roller is about $\frac{3}{16}$''. The shaft has at said hub a driving connection to the roller near the end of the roller 14 and the roller is driven through the shaft by the gear 26, the axis of which is substantially stationary, the gear being supported by the shaft 36 which is supported in stationary bearings 37 at the side of the gear. The frame 2 at the left has formed therein a bearing 48 which contains a tubular member 49 shown as eccentrically bored at 50. This tubular member projects on both sides of the frame and is secured against endwise motion in the bearing 48 by a collar 51 on the inside of the frame 2 and on the outside it is provided with a toothed gear 52 which meshes with a pinion 53 on the pinion shaft 42. The tubular member 49 carries at its outer end a ball bearing 54 for the shaft 36 in relation to which the shaft 36 is permitted a slight rocking motion as described, about an axis transverse to the shaft. For purposes of adjustment of the roller 14, bearing 54 is moved up and down to a slight degree, i. e. in this instance $\frac{3}{32}$'' on each side of a normal center position. The other end of the shaft in the bearing 39 has no perceptible up and down motion but is permitted to rock slightly in the bearing 37. As the radius is about 110'' from the center of bearing 54 to the center of bearing 57 and the swing is never much over $\frac{3}{32}$'' on each side of the center of the arc of swing, the rocking of the gear 26 relatively to the gear 25 is imperceptible and causes no difficulty or noise or grinding in the operation of the gear.

The shaft 36 is secured at the right end by a cap 55 which extends outwardly over the hub of the gear 52 and is attached to the end of the shaft by a cap screw 56. The shaft 36 being supported at the left end by ball bearing 54 within the hub of the gear 52, no provision for a bearing of the shaft in the aperture 50 is necessary and this aperture may be of excessive diameter and so is not necessarily eccentric, although it is preferably so, to provide sufficient strength in the tubular housing 49 without excessive diameter.

In the operation of this adjustment the tubular bearing members 38 and 49 are located in correspondence and are rotated simultaneously by operation of the shaft 42 carrying the pinions 41 and 53 meshing with the gears 40, 52. In adjusting the roller 14 the rotation of the eccentric bearing 45 raises and lowers the right hand end of the tubular presser roller 14 relatively to the adjacent end of the shaft 36 and to the stationary elements of the machine, but the gear 26 has no up and/or down motion. The rotation of shaft 42 also rotates the gear 52 and the eccentric bearing 54 which raises and lowers the left hand end of the shaft 36 in the present instance for the purposes of adjustment to the different standard thicknesses of corrugated board $\frac{3}{32}$'', above and below the normal center position of said shaft. The left hand end of the presser roller 14 being directly supported on the shaft 36 adjacent the bearing 54 by the disk 46 is raised and lowered in direct correspondence with the right hand end of said rollers, the eccentricity of the bearings 54 and 45 being of identical dimension and opposite, the long radius of one eccentric being above and the other below the axis, one eccentric being inside and the other outside the member which it engages and lifts. This gives a simultaneous raising and/or lowering of the two ends of the roller. The shaft 36 rocks relatively to roller 14 or vice versa by an angle represented by the length of the roll, 110'' the radius, and $\frac{3}{32}$'' the arc of swing at the end of the radius. This angle is so small that the rocking of the gear 26 is not perceptible and has no harmful effect on the operation of the gears 25 and 26 and causes no grinding.

The adjusting mechanism described is applied to each of the presser rollers 14, 18, 20 and 22 and to any rollers which it may be found desirable to adjust in this way, the adjusting mechanism being indicated in a general way in each instance by reference character 58, Figure 1. The eccentrics are locked and the rolls are held in the desired position of adjustment by clamping mechanism 57 illustrated in Figure 1 and more fully illustrated in the previous application referred to. This clamping mechanism consists in each instance of a split collar 59 encircling the shaft 42 and mounted on a flanged plate 60 which plate is provided with lugs 61 which are bolted or otherwise secured to the hood or guard plate 44 through which the ends of the shafts 42 project, the square ends 43 being exposed for engagement by hand crank or wrench as already described.

The split collars 59 are closed, each of them, by a bolt or screw stud 62 by which they are tightened about the corresponding shaft 42 to hold the adjusting mechanism and the rolls in the desired position of adjustment. The tension bolts 62 are operated by means of hand cranks 63, one of which is secured to each bolt 62 beneath its head 64. It will be understood that the clamps 57 are loosened to release the pinion shafts 42 for adjustment of the rollers and are

tightened after the adjustment to hold the parts in adjusted position.

Figures 5 and 6 illustrate an alternative form of roll adjustment which has certain principles and elements in common with the one just described, but in which the position and alignment of the roll shaft axes are not changed.

In this instance a presser roller 14' which corresponds to the roller 14, is mounted on ball bearings 65 which are eccentrically related to a tubular member 66 which carries the inner ball race 67 of the bearing 65. This inner race 67 is referred to as an eccentric member. The outer race 68 is carried by the roller 14' which is preferably tubular or bored concentrically with its outer surface as already described in connection with the first form of the invention. The tubular members 66 carrying eccentric members 67 are duplicated at each end of the roller. These members are mounted to be rotated in bearings 69 in the side frame members 1 and 20, and the said tubular members 66 are provided at the outer end of said tube resting on the outer surface of the frames 1 and 2 with toothed gears 70 which are operated for purposes of adjustment of rollers 14' by pinions 71 on the pinion shaft 72 which is also mounted in suitable bearings in the frame. The shaft 74 of the roller 14' is mounted near its ends in roller bearings 73 located inside the tubular members 66 and concentric therewith so that the center of the shaft 74 is not shifted by adjustment of the roller. The races 67 are eccentrically located as to said tubular members 66, and said bearings 69, the amount of eccentricity being as previously described in connection with the first form of the invention and the two eccentrics at the two ends of the shaft are identically related as to the gears 70 and shaft 72 in the operative assembly of the machine.

The roller shaft 74 is provided at its outer end outside of the frame 1 with a drive gear 26' suitably keyed thereto and secured by means of a cap 75, a similar cap 76 being provided outside the gear 70 to prevent endwise play of the shaft.

The driving connection of the presser roller 14' with the roller shaft 74 is effected by means of a hub 77 which is preferably mounted on the shaft 74 inside the roller and keyed to the shaft. This hub is also keyed to the roller by means of keys 78 seated in slots 79 inside the roller and having a somewhat free engagement with slots 80 in the periphery of the hub which provides sufficient play to permit the roller to be adjusted up and down relatively to the shaft by means of said eccentric members 67 which in this instance are the inner ball races 67. However, it should be understood that the elements described in connection with both forms of the invention are capable of considerable variation and change of design within the scope of the invention and without departure from the invention.

The adjustment is clamped and operated as described in connection with the previous form.

In the first form of adjustment the shaft of the roller being adjusted is rocked slightly about a transverse axis near its end, the drive gear being mounted on the shaft near said transverse axis so that it is not shifted transversely to the shaft axis but is rocked imperceptibly without effect on the operation of the gears. In the second instance the shaft is not shifted at all and the axis of the drive gear is stationary giving no change of its driving relation to the gears with which it meshes. In both instances the roller is shifted relatively to the shaft but in the first instance the driving end of the shaft when it is connected to the roller moves with the roller, the roller being shifted relatively to the end of the shaft which carries the driving gear and which is substantially stationary except for rotation about its axis.

The manner of adjusting the rollers to adapt the machine to operation on paper of different thicknesses has been fully described in connection with the description of the adjustments, it being understood that in the normal operation, the adjustment of all the presser rollers would be the same and the adjustments of all these rollers would be changed to the same extent for each different adjustment of the machine.

The advantages of the invention providing adjustment of the rollers to different thicknesses of material without the necessity for slotting the frames and hence weakening them, making it possible to use frames of much lighter construction than previously, have been fully pointed out in the preamble, the convenience, simplicity and accuracy of the adjustment being apparent from consideration of the construction and comparison thereof with the previous structures. Other advantages of the invention are that the centers of the driving gears remain stationary, making it unnecessary to provide intermediate gears for purposes of adjustment and also that the centers of these gears not being changed, there is no change of pitch line and no grinding of the gears on account of changes of adjustment. These points are of particularly great importance with high operating speeds now employed.

It is also an important advantage of the invention that the manner of adjustment without changing the position of the center of the drive gear provides for the use of dust casings and the like, or oil casings which protect the gears from the grit which accumulates. With this type of adjustment there is no necessity for moving these oil casings when the position of the rolls is to be changed and they can be made completely dustproof in the absence of adjusting slots.

It is also an advantage of the invention that by eliminating all backlash it gives a smooth continuous drive with greatly increased accuracy as compared to other adjustments of the rolls on which the gears are moved and hence cause backlash.

I have thus described specifically and in detail the preferred and a modified form of the invention in order that the manner of constructing, applying, operating and using the invention may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

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

1. In a machine for operating on corrugated paper of different thicknesses, having pairs of cooperating rollers, means for adjusting one roller of each pair, said roller having an axial chamber, a shaft for said roller substantially coaxial therewith and bearing thereon a driving connection in said chamber connecting the shaft to the roller providing for radial motion of the roller relatively to the shaft, bearing members eccentrically related to the axis of the said shaft rotatively supporting said roller, means for rotating said eccentric bearing members to change the position of the axis of the roller in a direction transverse to said axis, one said bearing for said shaft having a stationary axis and a driving gear

on said shaft adjacent and supported by said latter bearing.

2. The combination in a machine for operating upon paper of different thicknesses for the production of box blanks of a pair of cooperating rollers comprising a presser roller, eccentrically mounted rotatable bearing members adjacent the ends of said roller, bearing members carried by the roller rotating upon said eccentric bearing members, a roller shaft having a driving gear thereon and a driving connection to the roller providing for radial motion of the roller relatively to the shaft, permitting the roller to be moved relatively to the shaft, the shaft having a supporting bearing, the axis of which is stationary, and which supports said driving gear, means for rotating said eccentric bearing members to adjust the roller transversely to its axis, and means for locking said adjustment.

3. In a printer slotter having a pull roller, a printing roller and a scoring roller, a presser roller cooperating with each said roller, and means for adjusting said presser rollers, each said presser roller having an axial chamber, eccentrically mounted bearing members and rotary bearing members rotating thereon supporting the presser roller, a drive shaft for each said roller extending into said chamber and having a flexible driving connection with the roller in said chamber, a drive gear on said shaft, an axially fixed bearing for said shaft supporting said drive gear, means for rotating said eccentric members to adjust said roller in directions at right angles to said shaft, and means for holding said eccentric members in various positions of adjustment.

4. In a machine for operating on paper board of different thicknesses in connection with the manufacture of box blanks, a series of pairs of cooperating rollers, the rollers of each pair engaging said paper from opposite sides, means for adjusting one roller of each pair, comprising eccentrically mounted rotative bearing members for said rollers, bearing members rotating on said eccentric bearing members, and supported by said eccentric bearing members, said adjustable rollers being mounted on said second mentioned bearing members, a drive shaft for each adjustable roller having a drive gear thereon, a stationary bearing supporting each said shaft adjacent its drive gear, and a drive connection from each said shaft to the corresponding roller, said connection having a yielding engagement providing for motion of the roller in radial directions relatively to said shaft and means for rotating said eccentric bearing members to adjust the position of the roller at right angles to its axis and means for holding said eccentric bearing members in various positions of adjustment.

5. In a machine for operating upon paper of different thicknesses in the production of box blanks, a plurality of pairs of rollers, the rollers of each pair engaging the paper from opposite sides and means for adjusting one roller of a plurality of said pairs, said adjustable rollers being hollow and having a shaft extending therethrough, a drive gear on said shaft externally of said roller, a bearing supporting said shaft adjacent said gear, said bearing having a fixed axis, an eccentrically mounted bearing member adjacent said shaft bearing, the roll having a cooperating bearing member secured to the end of the roller and engaging said eccentric bearing member to rotatively support the end of the roller thereon, means for rotating said eccentric bearing member to adjust the said end of the roller at right angles to the axis, the shaft having a drive connection to the said roller remote from said eccentric member, said driving connection permitting the shaft to rock slightly in the direction of its length relatively to said roller and the roller being supported on the shaft remotely from said eccentric member, an eccentrically mounted bearing supporting the shaft adjacent said point of support of the roller on the shaft, means for rotating said eccentric bearing member which supports the shaft to adjust the roller at said point of support in the same direction that the other end of the roller is adjusted, and means for holding the adjusting elements in various positions of adjustment.

6. In a machine for operating upon paper of different thicknesses performing a step in the production of box blanks of a pair of rollers engaging the paper from opposite sides, means for adjusting one of said rollers toward and from the other roller comprising bearing members supporting said adjustable roller and a shaft substantially concentric therewith for driving said roller, and means for adjusting said bearing members transversely of said shaft relatively thereto to determine the adjusted position of said roller, a drive gear on the shaft and a bearing having a substantially stationary axis supporting said shaft and said driving gear, and a flexible connection between said shaft and gear.

7. In a machine for operating upon paper of different thicknesses performing a step in the production of box blanks of a pair of rollers engaging the paper from opposite sides, means for adjusting one of said rollers toward and from the other roller comprising bearing members supporting said adjustable roller and a shaft substantially concentric therewith for driving said roller, means for adjusting said bearing members transversely of said shaft and relatively thereto to determine the adjusted position of said roller, a drive gear on the shaft, a bearing having a substantially stationary axis supporting said shaft and said drive gear, and a driving connection between the roller and shaft having play to maintain the driving relation and permit motion of the roller radially of the shaft.

8. In a machine for operating upon corrugated paper of different thicknesses, a pair of rollers engaging the paper from opposite sides in the performance of a step in the manufacture of box blanks, means for adjusting one of said rollers toward and from the other roller for the purpose stated, said adjustable roller having a drive shaft, a driving connection from said shaft to the roller providing free motion of the roller transversely of the shaft and vice versa, a bearing for the roller adjacent one end, means for adjusting said bearing transversely of the shaft axis, a bearing for the shaft adjacent said roller bearing and a drive gear on the shaft supported by said shaft bearing, a bearing for the shaft adjacent the opposite end of the roller, means for adjusting said bearing in correspondence with the adjustment of the roller bearing, the roller being supported on the shaft adjacent said latter shaft bearing.

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