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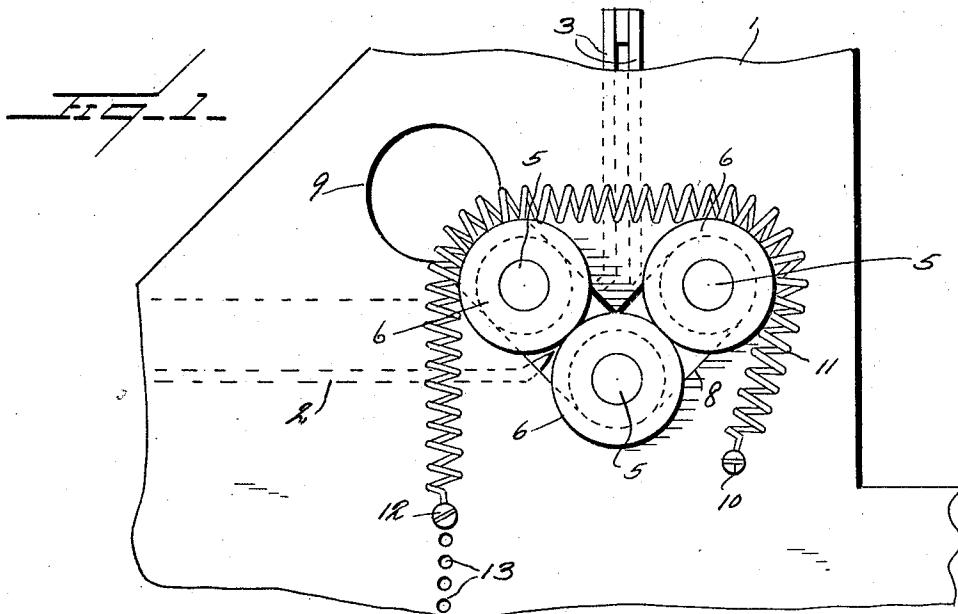
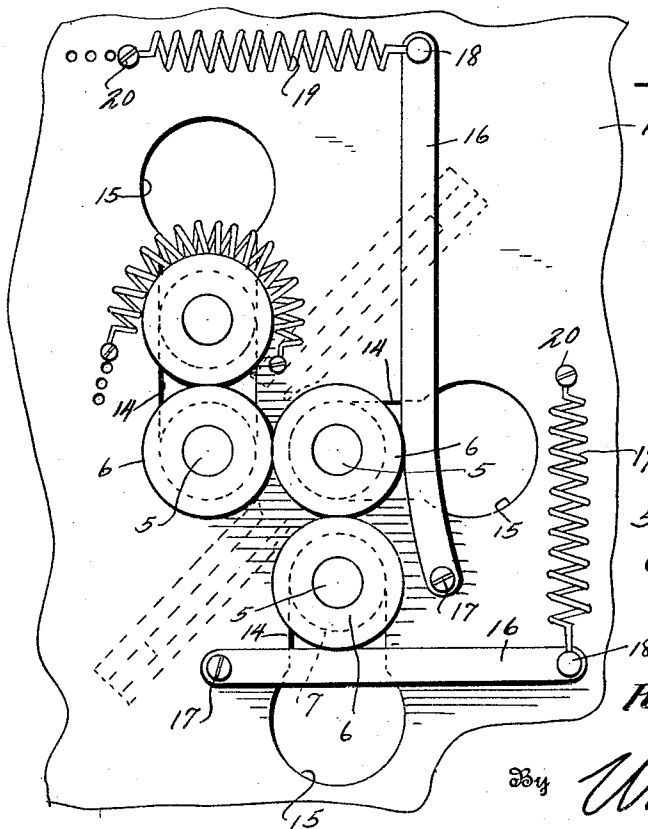
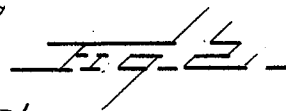
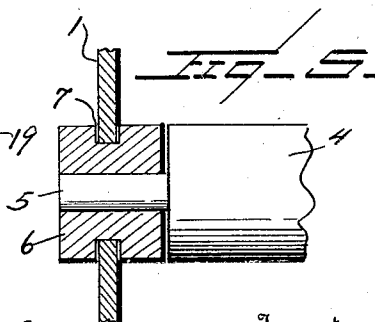
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SELF ALIGNING BEARING FOR FOLDING MACHINE ROLLERS

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2 Sheets-Sheet 1



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SELF-ALIGNING BEARING FOR FOLDING MACHINE ROLLERS

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This invention relates to bearings and pertains more particularly to bearings designed especially for the support of rollers used in folding machines and has for its general object to provide an improved frame construction and means whereby self-aligning of the folding machine roll supporting bearings will take place.

Another object of the invention is to provide a folding machine wherein the roller supporting bearings are so held that removal of the rollers and the bearings and replacement thereof may be made without danger of getting the rolls or bearings out of alignment.

In the paper sheet folding machines of the type at present in use the small and moderate sized machines generally have frames of cast iron each side frame usually consisting of one piece. After the machine frame is assembled the bearings for the folding rolls are pressed into place and line reamed to fit preparatory to putting in the folding rolls. In order to put in the rolls after the frame has been assembled to this point one side of the frame must then be taken down and when it is replaced after the rollers have been put into position the alignment of the bearings is often lost resulting in the necessity of readjusting the bearings, which operation is costly and adds materially to the general cost of the machine.

One of the principal objects of the present invention is to overcome the difficulties in obtaining the proper alignment of the roll supporting bearings and this is accomplished by providing a folding machine frame of material having a high tensile strength with the side walls thereof provided with pockets or slots into which circumferentially grooved round bearings may be slipped, each of these bearings being formed to receive a trunnion of a folding roll. These bearings are lined up in their respective slots or pockets and held securely against longitudinal movement in the pockets by spring tensioned holding elements.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accom-

panying drawing forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims herein.

In the drawings:—

Figure 1 shows the application of the present invention to a single buckle fold machine.

Figure 2 shows the application of the invention to a two parallel buckle fold machine.

Figure 3 shows the application to a knife fold machine.

Figure 4 shows the application of the invention to a two parallel arrangement of the gripping rolls.

Figure 5 is a sectional view through one end of one of the rolls and supporting bearing therefor.

Referring more particularly to the drawings wherein like numerals indicate corresponding parts throughout the several views it will be seen that the same general method of removably positioning the folding roller supporting bars in position in the frame of a machine is employed in each of Figures 1 to 4 inclusive, although slightly different methods are employed for maintaining the bearings in position after being mounted in the frame.

In each of the figures referred to a portion of a folding machine frame is indicated generally by the numeral 1.

In Figure 1 the arrangement of rollers shown is for the formation of a single buckle fold. In this figure there is shown a portion of the paper feeding table of the machine indicated by the numeral 2 and a paper receiver or buckle which consists of a pair of spaced plates 3 of the usual well known construction, the inlet of this receiver being arranged within the apex of a V-shaped arrangement of the paper rolls each of which is here indicated by the numeral 4. These rolls are as previously stated arranged in V formation and each has at each end a trunnion 5 which

extends through a bearing spool 6 which has formed circumferentially thereabout the slot 7. The V-shaped arrangement of this group of rolls is maintained by positioning the bearings of the rolls in similarly formed slots 8 formed in the side walls 1 of the machine frame, one end of this slot being extended and enlarged as indicated at 9 to form a circular opening of a diameter larger than the over all diameter of the bearing spools, the width of the slot being but slightly greater than the diameter of the groove formed about the spools.

It will be readily seen that the roller supporting bearing spools may be slipped into their slots 8 by inserting them and the rollers through the openings 9 of the slots which are aligned transversely of the machine to bring the grooves or slots about the spools in position to engage the opposed edges of the slots. After the proper number of rolls has been placed in position any one of several desirable methods may be employed for maintaining them in place, one method, as shown in Figure 1, being to secure to each frame at a point below the group of rolls and at one side thereof as for example at 10 after securing one end of a coiled spring 11, the body of which is then passed over the group of bearing spools adjacent thereto and drawn down upon the opposite side of the group for attachment to a screw 12 adjustably mounted in the frame wall in one of the vertically aligned series of apertures 13.

Figure 2 shows an arrangement of rollers and bearing spool receiving slots 14 for the formation of two parallel buckle folds, the bearing spool receiving slots 14 being arranged with two thereof extending vertically in offset parallel relation with a third extended at right angles to the lower end of the upper and longer one of the first mentioned ones. Each of these slots 14 terminates at its outer end in the enlarged circular portion 15 into which the bearing spools are inserted preparatory to moving them into position in the slots in the same manner as described in connection with Figure 1.

In the structure shown in Figure 2 a slightly different method is employed for forcing the bearing spools into position in their respective slots, in conjunction with the coiled spring 11 shown in Figure 1.

In this arrangement the bearing spools of the single rollers are held in place in their respective slots by bars 16, each of the bars being pivotally attached as indicated at 17 to the adjacent frame wall intermediate the ends of the slot so that it can be extended thereacross, the opposite end of the bar having attached thereto as at 18 one end of a coiled spring 19 the other end of which is suitably attached as at 20 to the wall of the frame. From this arrangement it will be readily seen that the tendency of the spring 19 is to pull

the bar 16 toward the bearing spool in the slot across which the bar extends, slight give being allowed the bar so that any necessary separatory movement of the rollers may take place.

Figure 3 shows an arrangement of two rolls in a horizontal slot 21 where a knife fold is to be made, this slot having one end enlarged as indicated at 22 in the manner described in connection with the other figures to facilitate the placement of the bearing spools in the slot. A coiled spring 23 having one end attached to the frame wall as at 24 is passed about the outer one of each of the bearing spools, the other end of the spring being attached to an adjustable pin 25. With this arrangement the spring serves to give the proper folding tension and also serves to hold the rolls in place and makes for quick and less costly assembly than in older methods of construction.

Figure 4 shows a two parallel arrangement or grouping of the rolls, that is while three bearing slots are formed in each side of the frame to facilitate mounting of three roll units two of these slots which extend vertically are in alignment whereas one is offset and extends at right angles, each of the slots in this figure being indicated by the numeral 26 and each, as in the other cases, terminating in the enlarged outer end portion 27.

Pivotally mounted at one side of each of the slots wherein one bearing spool only is mounted or in other words in the horizontal slot and the lower one of the vertical slots, is a tension bar 28 which extends transversely of the adjacent slot and has the end remote from the pivot point attached to a spring 29 which in turn is connected as at 30 to the frame of the machine.

Mounted adjacent each of the two bars 28 upon the side thereof from which the spring 29 extends is a post 31 through which is threaded an adjusting screw 32 which bears against the adjacent bar. It will be apparent from the foregoing description taken in connection with the showing of Figure 4 that the pressure of the bars 28 upon their respective bearing spools may be adjusted to a fine degree by the set screws 32 which oppose the normal movement of the bar against the bearing under the urge of the attached spring. The upper one of the vertical slots wherein two bearing spools are mounted has extended thereacross a coiled spring 33 each end of which is secured to the adjacent frame as at 34 so that the spring is stretched across the upper one of the spools and exerts a downward pressure thereon.

By making the outside diameter of the bearing spool anywhere from .0005 to .001 of an inch larger than the diameter of the rolls the knurled surfaces, or in some cases rubber faces, of the rolls are prevented from running on each other when paper is not passing there-

between thus giving longer life to the rolls than would be the case if they came into contact and also prevents the destroying of the gripping action of the roll faces.

The small space between the rolls provided by this method is less than the thickness of an average sheet of paper which is about .0035 of an inch and does not, therefore, allow the paper to slip.

From the foregoing description it will be readily apparent that in a machine having roll supporting bearings mounted therein in accordance with the present invention any or all of the rolls may be easily and quickly removed for examination, cleaning or replacement and returned to position or new rolls put in without danger of destroying the alignment of the bearings for the same will be automatically pushed into the right position by the holding device as soon as the same are replaced.

While I have shown two methods whereby the bearings may be held in position it is, of course, apparent that other methods may be devised along similar lines for accomplishing the same results; therefore, I do not wish to be limited to the specific construction shown and described. One modified form of the structure at present shown relating to the form of bearing and method of mounting the same may be made by forming the bearing spools of rectangular cross-section instead of circular as shown and providing opposite edges thereof with grooves for the reception of the opposed edges of the receiving slot.

By providing the pivoted holding bars 16 and 28 increased tension may be obtained upon the rollers of the machine as the folds of paper passing therebetween become thicker. It will be noticed that these holding bars are only used in association with rollers engaging sheets in which two or more folds are formed. The coiled spring method of holding the rollers in place supplies sufficient pressure to make proper single folds.

Having thus described my invention, what I claim is:—

1. In a paper folding machine, a frame including a pair of opposed walls each having a slot formed therein, each of said slots being enlarged at one end to provide a circular aperture, said slots and apertures being in alignment transversely between said walls, transverse paper folding rollers each having a trunnion at each end, bearings for said trunnions each comprising a spool adapted to extend into a slot aperture and having a circumferential groove adapted to receive the opposed edges of the slot, and a tensioning spring extending transversely of each slot and connected to the adjacent wall and bearing against the bearing spool nearest the slot aperture.

2. In a paper folding machine, a frame including a pair of opposed walls each having

a slot formed therein, each of said slots being enlarged at one end to provide a circular aperture, said slots and apertures being in alignment transversely between said walls, transverse paper folding rollers each having a trunnion at each end, bearings for said trunnions each comprising a spool adapted to extend into a slot aperture and having a circumferential groove adapted to receive the opposed edges of the slot, a holding bar extending transversely of the slot between the outer bearing spool and the slot aperture and pivotally attached at one end to the wall, and a spring attached at one end to the other end of said bar and having its other end secured to the adjacent wall.

3. In a paper folding machine, a frame including a pair of opposed walls each having a slot formed therein, each of said slots being enlarged at one end to provide a circular aperture, said slots and apertures being in alignment transversely between said walls each having a trunnion at each end, bearings for said trunnions each comprising a spool adapted to extend into a slot aperture and having a circumferential groove adapted to receive the opposed edges of the slot, a holding bar extending transversely of the slot between the outer bearing spool and the slot aperture and pivotally attached at one end to the wall, a spring attached at one end to the other end of said bar and having its other end secured to the adjacent wall, and an adjusting set screw adjacent said bar and adapted to engage one edge thereof to shift the same in opposition to said spring.

4. In a bearing structure of the character described, a supporting body comprising a pair of spaced walls each having a slot formed therein, said slots being in alignment transversely of the walls, a pair of bearing units associated with each of said slots, each of said units being formed to receive and support one end of a folding roller and each further being formed to receive the opposed edges of its associate slot, and folding rolls mounted between the units of said walls, said units in each of said slots being in abutting relation and further being of a size to maintain the rolls in slightly spaced relation.

5. In a bearing structure of the character described, a supporting body having a slot therein providing two parallel opposed edges, said slot being enlarged at one end, a bearing unit insertable into said slot at said enlarged end and having a peripheral recess for the reception of said edges, an elongated holding member disposed across the slot and across one face of the body and extending across and yieldingly bearing against said unit, and means for adjusting the position of one end of said member to alter the pressure exerted thereby on the unit.

6. In a bearing structure of the character described, a supporting body having a slot

therein providing two parallel opposed edges, said slot being enlarged at one end, a bearing unit insertable into said slot through said enlarged end and having a peripheral recess for the reception of said edges, a bar extending transversely of the slot and pivotally attached at one end to one side of said body, said bar bearing against the unit, a spring member attached at one end to the other end of said bar, and means for adjustably attaching the other end of the spring to the supporting body for regulating the pull of said spring on the bar.

7. In a bearing structure of the character described, a supporting body having a slot therein providing two parallel opposed edges, said slot being enlarged at one end, a bearing unit insertable into said slot through said enlarged end and having a peripheral recess for the reception of said edges, and a coil spring attached at one end to the body at one side of said slot and drawn across and partly surrounding said bearing unit and attached at its other end to the body at the opposite side of the slot.

8. A triple roll bearing assembly for a paper folding machine having a pair of spaced walls each provided with a substantially V-shaped slot, each of said slots being enlarged at one end, comprising three circular bearing units associated with each V-shaped slot, each of said units having a peripheral recess therein to receive the opposed edges of a slot, said units being insertable into their respective slots through the enlarged end thereof and each unit having an aperture for the reception of a folding roll trunnion, the units in each slot being arranged in V formation, and a resilient holding means for each group of units comprising an elongated spring attached at one end to the adjacent wall at a point below the top of the group of units and extending across the adjacent units and attached to the wall at the opposite sides and at a point below the tops thereof.

9. In a bearing structure of the character described, a supporting body provided with a pair of aligned slots each having two parallel opposed edges and each terminating at one end in an enlarged circular opening, a bearing unit adapted to be inserted into each slot through the opening at the end thereof and having a circumferential groove for receiving the opposed edges of the slot, a coil spring adjacent the supporting body having each end secured thereto, said spring extending across a slot and being drawn partially about the bearing therein, a bar member disposed transversely of the other end of each slot and having one end pivotally secured to the supporting body and normally pressing against the adjacent bearing, and a spring member connected at one end to the other end of the bar and having its other end attached

to the supporting body, the bearings in the aligned slots being held in contacting relation by the adjacent spring and bar disposed across the slots.

10. In a bearing structure of the character described, a supporting body provided with a pair of aligned slots each having two parallel opposed edges and each terminating at one end in an enlarged circular opening, a bearing unit adapted to be inserted into each slot through the opening at the end thereof and having a circumferential groove for receiving the opposed edges of the slot, a coil spring adjacent the supporting body having each end secured thereto, said spring extending across a slot and being drawn partially about the bearing therein, a bar member disposed transversely of the other end of each slot and having one end pivotally secured to the supporting body and normally pressing against the adjacent bearing, a spring member connected at one end to the other end of the bar and having its other end attached to the supporting body, the bearings in the aligned slots being held in contacting relation by the adjacent spring and bar disposed across the slots, a stud carried by the supporting body adjacent the bar, and a set screw threaded through said stud and having one end engaging said bar and adapted to shift the bar against the tension of the spring connected therewith.

In testimony whereof I hereunto affix my signature.

ROBERT J. WATERWORTH.