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PAPER PULLER

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FIG1

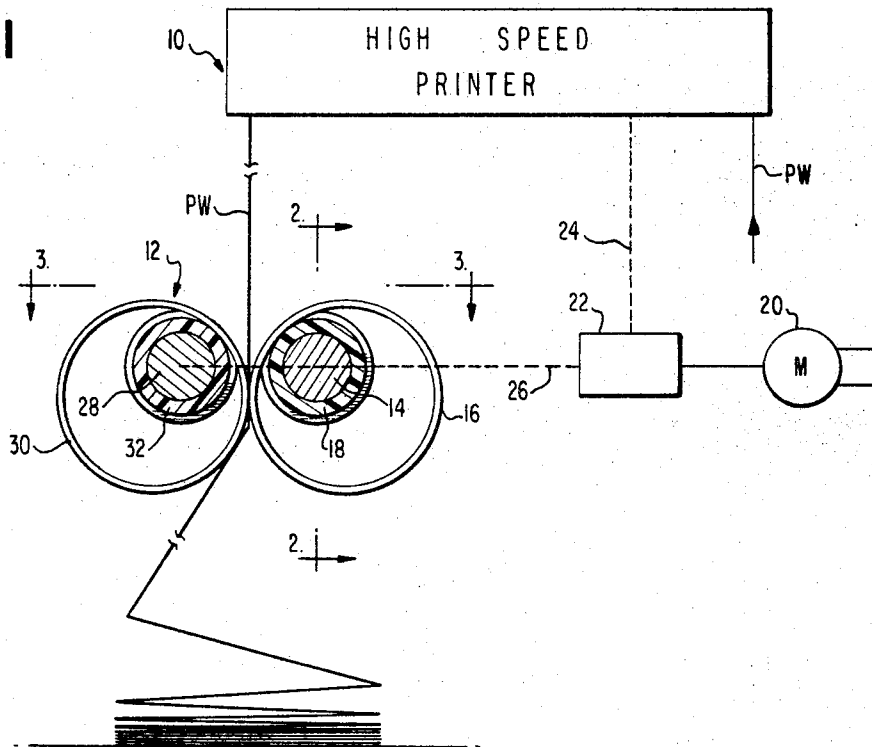


FIG2

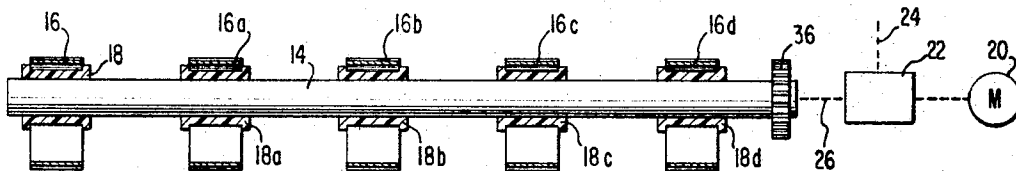
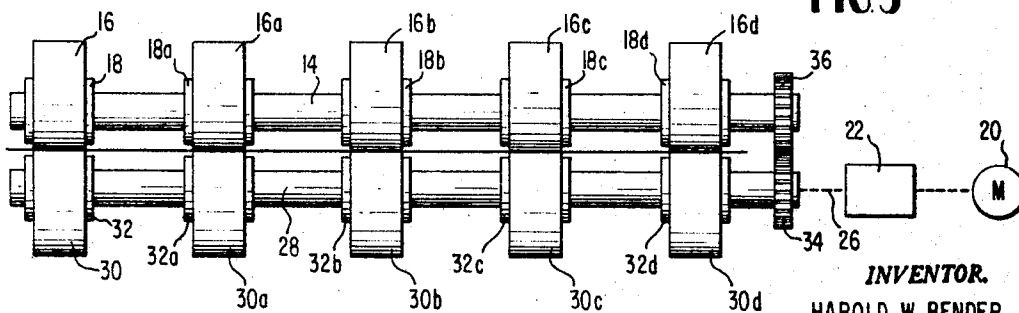


FIG3



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ABSTRACT OF THE DISCLOSURE

A paper puller which applies a controlled frictional force to pull a paper web emerging from a high speed printer includes a plurality of rings hanging loosely from parallel drive shafts of much smaller diameter than the inside diameter of the rings. The drive shafts are positioned such that loosely hanging rings on each shaft contact and apply a small force to opposite sides of the web. The shafts are driven at a speed so that the rings' outside periphery travels faster than the paper.

This invention relates to a web transport device which is utilized as a paper puller to apply a control impositive frictional force to a paper web such as that emerging from a high speed printer.

In the printing art, paper webs are printed at a very high speed, and the fan-folded paper web emerges from the printer and later folds itself into a stack of zig-zag folds. Problems are created in high speed printing if the paper fed from the printer is not kept taut before time for it to fold up on itself. Further, it has been found that applying a frictional pulling force to the paper as it emerges from the printer is highly desirable to prevent making loose folds during high speed paper feeding, especially when no carbon is involved. This pulling force keeps the paper somewhat taut as it emerges from the printer and keeps it from bunching up. It also allows the stacking operation to proceed without undue difficulties.

The paper puller of this invention utilizes a rotatable drive shaft from which a loosely mounted ring member hangs to be frictionally driven by the drive shaft so that the peripheral speed of the outer surface of the ring which frictionally contacts the web is greater than the speed of the web coming from the printer, and means are provided on the other side of the web to frictionally force the web in position against the ring member and displace the ring from its hanging position that it would normally take under the force of gravity so that the weight of the ring will supply some friction force to continue to pull the web taut from the printer.

The foregoing and other features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawing.

In the drawing:

FIGURE 1 is a somewhat schematic side elevation view of the paper puller of this invention;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1; and

FIGURE 3 is a view taken along line 3—3 of FIGURE 1.

Referring to the drawing, a paper web PW is fed into a high speed printer 10 of a known type and the printer prints thereon. The paper web PW then emerges from the rear of the printer and is normally stacked in fan-folded fashion in a stacker 11.

Between the stacker 11 and the printer 10, there is positioned the paper puller 12 of this invention for applying a frictional pulling force on the paper web PW emerging from the high speed printer.

The paper puller includes a rotatable drive shaft 14

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which loosely mounts a plurality of angular rings 16, 16a, 16b, etc. The rings are of lightweight material such as aluminum. The inside diameter of the rings is much larger than the diameter of the drive rod 14 so that they normally hang loosely under the force of gravity. To prevent rings 16, 16a, 16b, etc. from shifting laterally on the rod, the rod is provided with rigidly attached flanged spools 18 of plastic material.

The shaft 14 is driven from motor 20 through clutch 22 and this clutch is controlled from the high speed printer 10 by command link 24. There is a further drive connection 26 from the clutch 22 to the drive rod 14. The motor 20 drives the shaft 14 during the time the printer is in operation, so that the peripheral speed of the outside of rings 16 is greater than the speed of the paper web emerging from the high speed printer.

Means are provided for maintaining the web against the outside surface of the ring and for displacing the ring from its position that it would normally loosely hang under force of gravity. As viewed in FIGURE 1, rings 16 are displaced to the right of the normally free hanging position from the force applied to the opposite side of the web. This means for maintaining the web against the surface of rings 16 is preferably another arrangement including drive shaft 28, rings 30, 30a, 30b, etc., also loosely hanging from flanged spools 32 fixed to shaft 28. Inter-meshing gears 34 and 36 provide a drive connection to drive both shafts in opposite directions to apply frictional force to both sides of the web by means of the loosely mounted counter rotating rings 16 and 30. The arrangement of two sets of equal drive shafts and corresponding rings has the advantage of applying equal frictional force to both sides of the web and preventing separation of layers of a multilayered web (e.g., paper webs and carbons).

As can be seen in the drawing, the rings are displaced an extent such that a line between the center of the drive shaft and certain of the displaced ring is about 45° to the vertical.

The operation of the device is as follows:

The paper web PW is printed on within high speed printer 10 and emerges therefrom at a rapid rate; if it is not pulled taut it will tend to make loose folds at the printer. Command link 24 at the start of paper feeding in the printer 10 energizes clutch 22 to allow motor 20 to rotate drive rods 14 and 28 in opposite directions which accordingly will rotate spools 18 and 32 to frictionally drive loosely mounted rings 16 and 30. The positions of the rods and dimensions of the rings are such that the rings are displaced outwardly from each other so that the weight of the rings will aid in application of impositive frictional force to apply the correct amount of tension to the paper web PW as it emerges from printer 10 and before it folds itself in stacker 11. When paper feeding through the printer stops, the clutch 22 is deenergized so that the rings will not wear or smudge the web.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A puller for pulling a web of a paper or the like from a high speed feed means, such as a printer, the puller comprising;

(a) a rotatable drive shaft,

(b) at least one ring member of much larger internal diameter than the drive shaft loosely mounted over the drive shaft to be annularly and frictionally driven

by frictional contact with the drive shaft, and contacting one side of the paper web.

(c) means applying an impositive constant force on the side of the web opposite the side contacted by the ring at a point below a horizontal line through the center of the drive shaft for maintaining a web against the outside surface of the ring member at a point where the corresponding point on the inside surface of the ring member is not in contact with the drive shaft to displace the ring member from the position it would normally hang by gravity so that rotation of the drive shaft causes rotation of the ring member resulting in a frictional transport force upon the paper web in contact therewith,

(d) motor means driving the rotatable drive shaft at a speed sufficient to cause the outside surface speed of the ring to be greater than the speed of the paper emerging from the feed means.

2. A paper puller as in claim 1 wherein the means for maintaining the web against the outer surface of the ring comprises another rotatable drive shaft, with other ring members loosely mounted thereon to be annularly and

frictionally driven thereby, the position of the drive shafts and diameter of the ring members being such that the rings are forced by each other away from the position they would hang under force of gravity and the point of contact of the rings on both shafts with the paper web is below a line connecting the centers of the drive shafts.

3. A paper puller as in claim 2 wherein each drive shaft carries a plurality of ring members.

4. A paper puller as in claim 3 further comprising flanged spools fixed to each drive shaft for supporting each loosely hanging ring and preventing lateral travel thereof.

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