United States Patent

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[54] **PRINTER-SLOTTER MODULE GEAR TRAIN BRAKE**
9 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **101/183**
[51] **Int. Cl.** **B41f 13/00**
[50] **Field of Search** 101/180, 181, 182, 183, 184, 185, 247, 248

[56] **References Cited**

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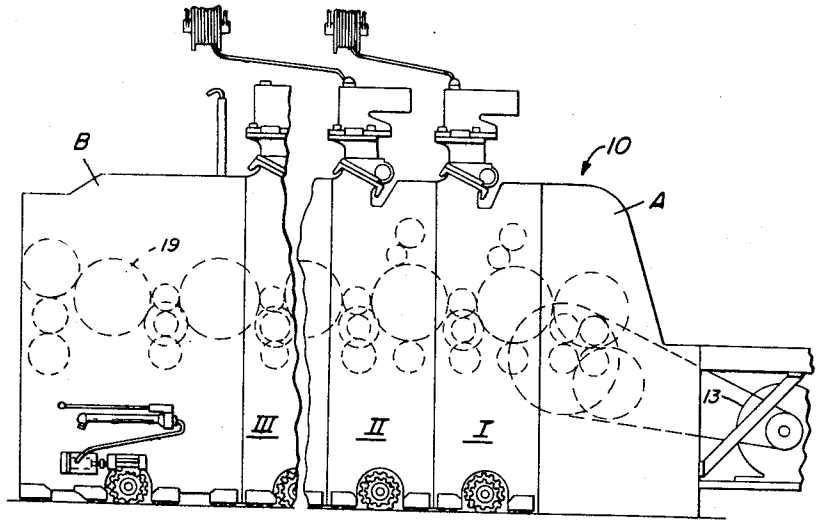
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ABSTRACT: A printer-slotter used for printing and slotting carton blanks of double-faced corrugated board is provided with a gear train brake. The gear train brake is used for preventing undesired rotation of the gears during certain operations.



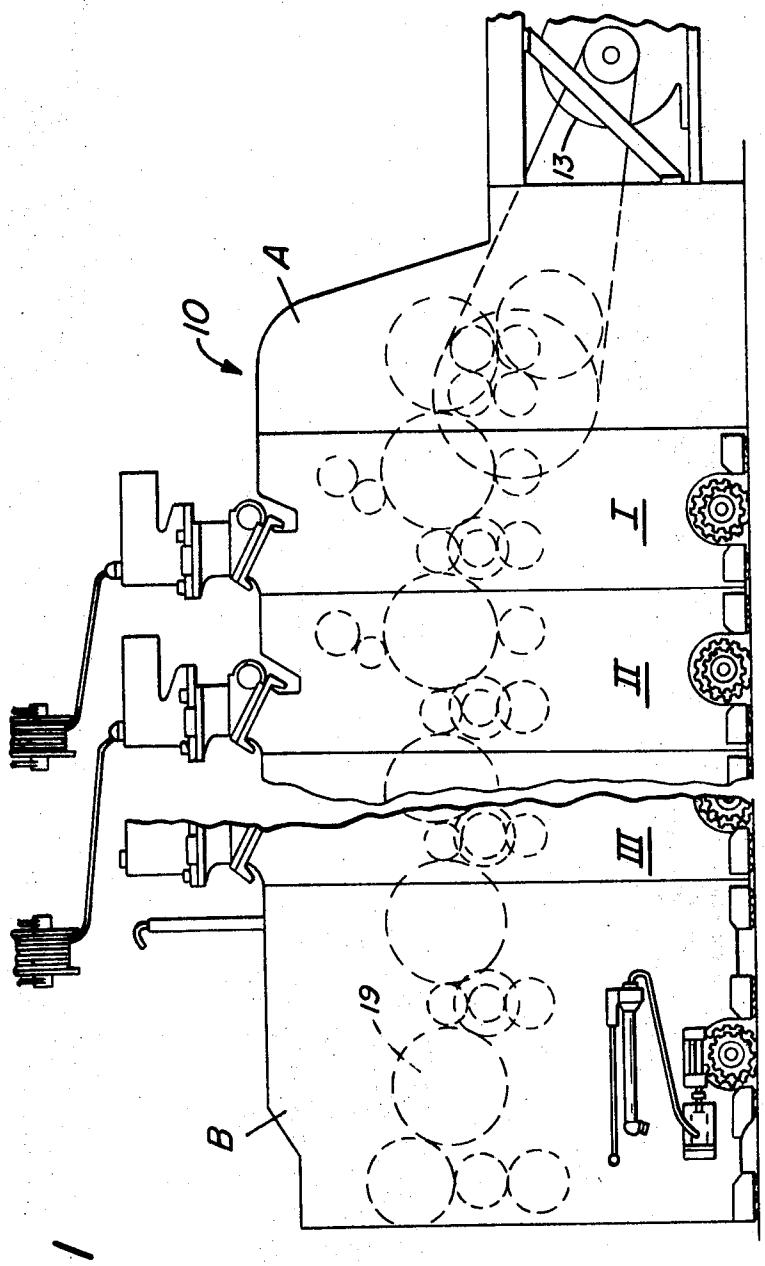


FIG. 1

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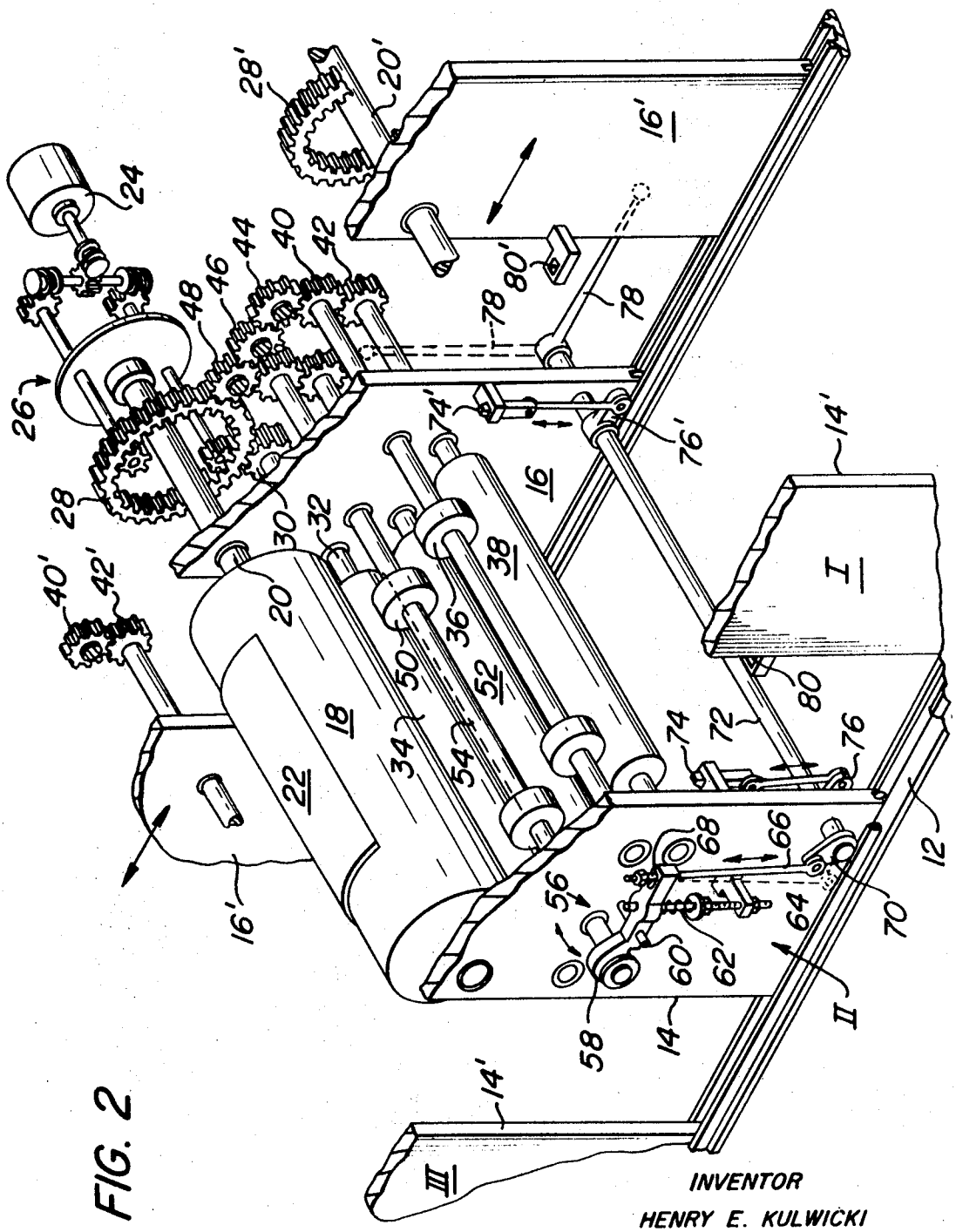


FIG. 2

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PRINTER-SLOTTER MODULE GEAR TRAIN BRAKE

This invention relates generally to printer-slotters for printing and slotting carton blanks which are usually of double-faced corrugated board or the like. More particularly, this invention relates to a printer-slotter having a gear train brake to permit selective restraining of a cylinder thereof during a die fitting, die or slotter head adjusting operation. The cylinder may be a print cylinder, a die-cut cylinder or the slotter head cylinder.

In a conventional printer slotter machine, each operation is performed in a module which may be removed from the machine for the fitting of attachments, cleaning, servicing, etc. When the modules are in position for operative transmission of power from a main drive motor in the feed end module succeeding modules, power is transmitted by means of intermeshing gears to each module. If the printing module, for example, is separated from its adjacent modules, the power train gears are exposed and free to rotate.

When attaching a print cylinder die to the print cylinder, the usual practice is for the operator to separate the printing module from the remaining modules of the printer-slotter so that the components thereof are readily accessible. The printing die is then fastened to the print cylinder by means of staples, special clamps, adhesive, or other equivalent means. Because of the length of the usual die, the operator customarily rotates the print cylinder by energizing a compensator motor. That is, one edge of a die is secured to the print cylinder and then the compensator motor is operated or energized so as to cause the print cylinder to rotate through a portion of 360°. In this manner, the die is wound onto the print cylinder.

The torque necessary to wind a heavy die onto a print cylinder may be enough to turn the other shafts in the module instead of turning the print cylinder, since the motor turns the print cylinder through a differential. The gear train must be locked to insure the rotation of the print cylinder as well as to prevent the gear train from getting out of phase.

Since the die unbalances the print cylinder, the print cylinder will rotate as soon as power is removed by deenergizing the compensator motor. This balance of the print cylinder will cause rotation of the gears in the gear train bringing them out of phase so that they will not properly mesh when the modules are repositioned for operation of the print cylinder. Heretofore, operators have prevented rotation of the gear train by jamming a wedge of wood or other material into the gears. This has not been a desirable practice because the wedge of wood is removed just before the modules are closed and the gears may still rotate to an out-of-phase position. There is also the possibility of contamination of gear train lubrication oil by fragments of wood or other materials from the wedge.

It is an object of the present invention to provide a machine having separable modules with a gear train brake to prevent undesired rotation of the gears during certain operations on a cylinder thereof.

It is an object of the present invention to provide a brake on the gear train of a printer-slotter module to maintain the gears in phase when the module is disengaged from the drive gear train.

It is another object of the present invention to provide a printing module which insures rotation of the print cylinder while preventing rotation of a gear train associated therewith by means of a brake when the module is disengaged from the drive gear train.

It is another object of the present invention to provide means to lock a gear train automatically as a module detent mechanism is released.

It is another object of the present invention to provide means for unlocking a gear train automatically as a module detent mechanism is engaged and locked in position.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a schematic side elevation view of a printer-slotter in accordance with the present invention.

FIG. 2 is a partial perspective view of modules of a printer-slotter as illustrated in FIG. 1, illustrating the present invention.

Referring to the drawings in detail, wherein like numerals indicate like elements, there is shown in the drawings a printer-slotter designated generally as **10**. Printer-slotter **10** includes the feeder unit A and a delivery unit B having therebetween a plurality of printing units I, II and III. Each of the printing units in identical. Hence, only printing unit II will be described in detail. Corresponding structure may be illustrated with prime numerals on the remaining printing units.

Each of the units is a module adapted to be moved along a track **12** so as to separate the modules for purposes of setup, installation, adjustment, repair, servicing, etc. Printing unit **11** includes side frames **14** and **16** which rotatively support a print cylinder **18** on shaft **20**. A printing die **22** is attached to the print cylinder **18** in any conventional manner, such as by means of staples, special clamps, adhesive, etc. The shaft **20** may be selectively rotated by means of a compensator motor **24**. Motor **24** is coupled to shaft **20** by means o a drive mechanism designated generally as **26**. The drive mechanism **26** is coupled to a ring gear **28** by means of planetary gears.

The ring gear **28** is coupled to gear **30** on shaft **32**. A print anvil **34** is provided on shaft **32** and cooperates with the print cylinder **18**.

A plurality of feed rollers **36**, and **38**, **50** and **52** are provided for feeding the blanks to the print cylinder **18**. Feed roller **50** is mounted on shaft **54**.

The ring gear **28** is mechanically coupled to the shafts for the feed rollers **36**, **38**, **50** and **52** by means of a gear train including gears **40**, **42**, **44**, **46** and **48**. A brake designated generally as **56** is provided for selectively locking one of the shafts in a stationary position. For purposes of illustration, the shaft to be locked in a stationary position is shaft **54**. Shaft **54** is provided with an extension beyond the frame **14** for cooperation with the brake **56**.

The brake **56** includes a lever arm **58** mounted for pivotable movement on a pin **60**. Pin **60** is parallel to shaft **54**. Lever **58** is biased to a brake positioned by means of a spring **62**. Spring **62** is a coil spring surrounding a rod **64** adjustably supported by a bracket on frame **14**. One end of the lever arm **58** is curved for contact with the brakeshoe on shaft **54**. The other end of lever arm **58** is provided with an elongated slot **68** through which a rod **66** extends. The upper end of rod **66** is provided with a limit stop such as an adjustable nut.

The lower end of rod **66** is rotatably connected to one end of a crank throw **70**. The crank throw **70** is fixed secured to a shaft **72** extending transversely between the frames **14** and **16**. Between the frames **14** and **16**, crank throws **76** and **76'** are fixedly secured to shaft **72**. Each of the crank throws **76** and **76'** are connected by a crank shaft to latch pins **74** and **74'**, respectively. Each of the pins **74** and **74'** are adapted to cooperate with latch openings **80** and **80'**, respectively, on the adjacent module I. Rotation of shaft **72** through an arc of 90° is manually attained by means of a lever or handle **78**.

In the illustration of the drawings and the thusly described printer-slotter, it will be appreciated that the disclosure is highly simplified and only those details are illustrated which are essential for a full understanding of the invention. It will be understood by those skilled in the art that during operation of the printer-slotter, the gear trains of each module are driven by a common motor **13**. Thus, print cylinder **18** is driven from the common motor through gear **28**, drive mechanism **26**, and shaft **20**. As described above, cylinder **18** may be selectively rotated by motor **24**. For a more detailed description of the printer-slotter having modules which can be moved for purposes of servicing and setup, reference is made to Canadian Pat. No. 694,497.

During operation, the modules or units are juxtaposed and locked to one another. Each of the printing units is provided with a latch operated by means of a lever or handle **78**. When the units are locked to one another, each handle **78** is vertically disposed and the latch pins **74,74'** project into a latch opening on the next adjacent unit or module.

When the handle 78 is manually rotated 90° to the solid line position shown in FIG. 2, the latch pins 74 and 74' are retracted downwardly to the position illustrated so as to no longer enter the latch openings 80 and 80', respectively. At the same time, rotation of shaft 72 by handle 78 causes the rod 66 to move upwardly to a position that the nut at the upper end of rod 66 no longer contacts the lever arm 58. Thereafter, spring 62 expands and rotates the lever arm 58 about the axis of pin 60 to a position wherein the lever arm 58 embraces the extended portion of shaft 54, thereby locking the gear train. Thereafter, with the modules in their closed or extended positions, cylinder 18 may be rotated by motor 24 without disturbing the position of the gears of the gear train on each individual module.

With the modules in an extended position, it is possible to release the brake by rotating the handle 78 through an arc of 90° for any desired purpose. Generally, the handle 78 will remain in its horizontal disposition when the modules are in an open disposition since this will maintain the desired relationship for the gears of the gear train between adjacent modules. It will be obvious to those skilled in the art that any equivalent power device may be utilized in place of the spring 66.

While the invention has been described above in conjunction with the gear train for the print cylinder, it is equally applicable to a die cut cylinder as well as the slotter head cylinder 19 forming a part of the delivery unit B.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

It is claimed:

1. A machine comprising at least first and second modules, means mounting mounting said first module for movement to an open disposition with respect to said second module, a gear train on each module coupled to rotatable shafts on their respective module for rotatably driving said shafts, means on the shafts for performing an operation on a flat workpiece, said gear trains being coupled to each other and a common motor, means for latching said modules together, said latching means having an inoperative disposition wherein the modules may be moved to an open disposition, and a brake means on said first module for locking gear train in position so as to prevent rotation of said shafts and render the gear train immobile, a single actuator means connected to said latching means and brake means for automatically locking the gear train in position on said first module so as to prevent rotation of the gears forming a part of the first module gear train and for simultaneously latching means to its inoperative disposition, said single actuator means including a common actuator connected to both the brake means and the latching means.

2. A machine in accordance with claim 1 including a rotatable actuator shaft on said first module, means connecting said brake means to said actuator shaft for operating said brake means in response to rotation of said actuator shaft, means connecting said latching means to said actuator shaft for operating said latching means in response to rotation of said actuator shaft, and handle means on said actuator shaft for rotating the same.

3. A machine in accordance with claim 1 wherein said means for performing an operation on a flat workpiece on said first module includes a print cylinder on one of the shafts of the first module, a motor means coupled to said one shaft for independently rotating said shaft and its print cylinder with out interfering with the position of the gears on said one module gear train.

4. In a printer-slotter machine having a plurality of modules mounted so that they may move relative to each other to an open disposition, at least one of the modules being a printing unit, said printing unit having a plurality of shafts extending transversely thereacross, feed rollers on said shafts, a gear train coupling said shafts for driving relationship with a motor, a print cylinder coupled to said gear train and being parallel to said shafts, said cylinder being supported by said printing unit, means latching said modules together, said latching means having an inoperative disposition when the modules are in an open disposition, and a brake means for latching said gear train in position so as to prevent rotation of said shafts and render the gear train immobile, a single actuator means connected to said brake means and latching means for applying said brake means and for simultaneously rendering said latching means inoperative, and an independent motor means coupled to said cylinder for selectively rotating said cylinder without interfering with said gear train while the gear train is immobile, said single actuator means including a common actuator connected to both the brake means and the latching means.

5. A machine in accordance with claim 4 wherein said actuator means includes a lever connected to an actuator shaft on said printing unit, means connecting said latching means and said actuator shaft for operating said latching means in response to rotation of said actuator shaft, and means connecting said brake means to said actuator shaft for operating said brake means in response to rotation of said actuator shaft.

6. A machine in accordance with claim 4 wherein said brake means includes selectively operable means to release the gear train while the printing unit is an open disposition.

7. A printer-slotter machine comprising a plurality of modules mounted for relative movement so that the modules may be moved to an open disposition with respect to each other, at least one of said modules being a printing unit having a transversely disposed print cylinder and other shafts parallel thereto, means on said last-mentioned shafts for facilitating feeding of blanks to the print cylinder, a gear train on said one module connected to said other shafts and said cylinder for rotating the same, brake means on said one module for selectively locking said gear train into position so as to prevent rotation of said shafts and render the gear train immobile, said printing unit having a latching means thereon for latching the printing unit to an adjacent module, and a single actuator means for simultaneously releasing the latching means and applying the brake means, said single actuator means including a common actuator connected to both the brake means and the latching means.

8. A machine in accordance with claim 7 wherein said latching means is mounted for reciprocatory movement with respect to a mating element on the adjacent module, said brake means being mounted for rotation with respect to said one module about a horizontal axis between an operative position wherein it performs a braking action on the gear train and an inoperative position.

9. A printer-slotter machine comprising a plurality of modules cooperatively juxtaposed to process box blanks, means mounting said modules so that they may move relative to each other to an open disposition, at least one of said modules being a printing unit, said printing unit having parallel side frames and a transverse ink mechanism, a printing die cylinder supported by said printing unit parallel to said ink mechanism, an impression cylinder and coacting feed shafts extending across said printing unit, a gear train coupling said shafts and cylinders, means latching said modules together, said latching means having an inoperative disposition wherein the modules may be moved to said open disposition, a brake means for locking said gear train in position so as to prevent rotation of said shafts while rendering the gears of said gear train immobile, a single actuator means for rendering said brake means operative and for simultaneously rendering said latching means inoperative, and independent motor means for selectively rotating said die cylinder without interfacing with said gear train, said single actuator means including a common actuator connected to both the brake means and the latching means.