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## GOVERNOR-DRUM DRIVE FOR PRINTING PRESSES

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This invention relates to a governor-drum drive for printing presses.

An object of the invention is to provide a simple, highly effective governor-drum drive for printing presses the rotational speed of which may be selectively varied and accurately controlled.

Another object of the invention is to provide a governor-drum drive for printing presses which may be quickly adjusted whereby to correlate the rate of rotation of the governor-drum, also known as the pay-off drum, of a printing press relative to the rotational speed of the printing cylinders for compensating for differences in the thickness of the paper being fed through the printing press on different jobs.

A further object of the invention is to provide a governor-drum drive which is powered by the same drive means utilized to rotate the printing cylinders of a press.

Another object of the invention is to provide a governor-drum drive having the hereinabove described characteristics and which may be readily associated with existing presses for greatly enhancing their operating characteristics and efficiency.

These and other objects are attained by the means described herein and as disclosed in the accompanying drawings in which:

Fig. 1 is a diagrammatic view illustrating the paper feeding end of a conventional printing press, provided with a governor-drum drive embodying the teachings of the present invention.

Fig. 2 is a sectional view through the governor-drum drive mechanism of the present invention.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

At the outset it should be noted that with the advent of high speed rotary-type printing presses the overall thickness of the paper web becomes critical, and unless properly compensated for, will result in unsatisfactory performance of the press. Heretofore various techniques have been utilized in an effort to compensate for webs of varying thickness, the most common being that of providing one or more layers of thin paper around the outer face of the governor-drum for thereby slightly increasing its effective diameter whereby to compensate for the thickness of the paper being run through the press.

The subject drive enables an operator to positively, simply and very accurately control the rate of rotation of the governor-drum relative to the rotational speed of the printing and impression cylinders for any thicknesses of paper.

The exact center of a web of paper is considered its pitch line, and as the sheet thickness increases the pitch line is displaced farther from the outer surface of the governor-drum over which it passes, thereby resulting in a higher lineal speed of the pitch line for a given rotational speed of the drum. The speed of rotation of the printing and impression cylinders of a press are uniformly constant, wherefore the precise rate of feed of paper to the printing and impression cylinders becomes critical. The thicker the sheet or web, the slower the

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rate of rotation of the governor-drum, and, conversely, the thinner the thickness of the sheet, the faster the rate of rotation of the governor-drum relative to the rotational speed of the printing cylinders.

With particular reference now to Fig. 1, the numeral 10 denotes generally a typical or conventional drive shaft which is suitably powered for imparting uniform rotational speed to each of the various printing and impression cylinders 12 and 14, it being understood that in Fig. 1 I have illustrated only the first frame, 16, of a plurality of frames, each provided with printing and impression cylinders.

The numeral 18 denotes generally a gear box in which the rotary motion of shaft 10 is converted into rotary motion of gear 20 which meshes with an idler gear 22 in driven relationship with the impression cylinder 14 which in turn drives printing cylinder 12.

It should be clearly understood that the present invention is neither concerned with nor directed to the particular means by which cylinders 12 and 14 are rotated, the drawing being exemplary, rather than restrictive, in this respect.

With reference now to Fig. 1, the numeral 30 denotes generally a governor-drum or pay-off drum the purpose of which is to feed a strip of paper 11 from a suitable supply roll (not illustrated) to the cylinders of the printing press.

Means for imparting uniform tension to the paper web is interposed between the supply roll and governor-drum. In Fig. 1 I have illustrated a typical tensioning device which may include rollers 13 and 15 journaled on shafts 17 and 19, respectively, which span a pair of laterally spaced standards 21, and a roller 23 journaled in shaft 25 which spans a pair of laterally spaced levers 27 which are pivotally mounted to the standards as at 29. One end of a flexible connector 31 is secured to the upper portion of lever 27, the other end terminating in an abutment 33 for enabling weights 35 to be removably associated therewith for normally urging the lever in a counter-clockwise direction about pivot 29. Rollers 37 and 39 are provided for connector 31, as illustrated.

The lower end of the lever is secured to a brake rod 41 as at 43, it being understood that the said rod is operably connected to a suitable braking mechanism (not illustrated) for controlling the rotation of the supply roll of paper. Movement of lever 27 in a clockwise direction will result in a braking force being applied to the supply roll, whereas a counterclockwise movement results in a brake releasing action.

The amount of tension thus applied to web 11 is a function of weight 35. After having been properly tensioned, the web may be led under rollers 47 and 49 of a cat walk 51, thence over a guide roller 53 to the governor-drum 30.

As best illustrated in Fig. 2, the governor-drum is secured to and carried by a rotatable governor-drum shaft 32 suitably journaled, as at 34, on side frames 16, whereby the drum will be rotatably mounted between a pair of laterally spaced duplicate side frames or standards 16.

A pinion sleeve 40 is rotatably journaled on shaft 32 such as, by way of example, by means of bushings 42, whereby the sleeve may be freely rotated on the shaft. A gear 44 is secured to, carried by and is in fixed driving relationship, by means of a key 46, with drum shaft 32.

A control gear 50 is journaled on sleeve 40 by means of a bearing 52, which, in the preferred embodiment of the invention, is a commercially available seal-type of bearing. The control gear carries a shaft 54 to which planetary gears 56 and 58 are journaled, as by bearing 60. Suitable means, such as, by way of example, a face key 62, is provided for positively interlocking the gears for unitary rotation. The first planetary gear 56 is in driven relationship with pinion 64 of the pinion sleeve 40,

whereas planetary gear 58 is in driving relationship with drum-shaft gear 44.

Suitable means, such as gear 70, keyed as at 72 to pinion sleeve 40, is provided for imparting rotary motion to the pinion sleeve for thereby imparting what will hereinafter be referred to as a normal rotational speed to drum-shaft 32 via pinion 64, planet gears 56, 58 and gear 44, and with control gear 50 stationary.

In the preferred embodiment of the invention a cage 80 having cylindrical side walls 82 and an end wall 84 is secured to and carried by control gear 50 such as by means of bolts 86. End wall 84 is journaled on the outer end of shaft 32 by means of a seal-type bearing 86, whereby the cage will house planetary gears 56, 58, pinion 64, gear 44 and a portion of drum-shaft 32.

If desired, a transparent plate 88 may be secured as by means of screws 90 to the end wall of the cage for enabling an operator to quickly ascertain the height of lubricant within the cage. The numeral 92 denotes a filler plug.

The numeral 100 denotes a drive gear for control gear 50, it being noted that rotation of the control gear in the same direction as pinion sleeve 40 will increase the rate of rotation of drum-shaft 32 over its normal rotational speed; and conversely, rotation of the control gear in a direction counter to the direction of rotation of pinion sleeve 40 will decrease the normal rotational speed of the drum-shaft.

If desired, suitable speed control of the governor-drum may be obtained by utilizing the control gear to selectively reduce the normal rotational speed of the drum shaft as the thickness of the sheet increases. With reference now to Fig. 1, the numeral 102 denotes a commercial variable speed transmission such as, by way of example, a Graham vari-speed drive, interposed between drive shaft 10 and drive gear 100, wherein gear 100 is secured to output shaft 104 and input shaft 106 is connected via a positive acting, flexible, endless drive member 108 to drive shaft 10.

From the foregoing, it will be noted that gears 50 and 70 are literally powered or driven from common drive means 10.

In the preferred embodiment of the invention each of gears 64, 56, 58 and 44 have the same pitch diameters, however planet gear 56 has a greater number of teeth than the pinion 64; planet gear 58 has fewer teeth than planet gear 56, but more teeth than pinion 64 and the same number of teeth as gear 44.

In those instances in which it is desirable or necessary to decrease the speed of the governor drum below its normal rotational speed, all an operator need do is adjust dial 110 of the variable speed transmission whereby to start rotation of the control gear 50 in a counter direction to the direction of rotation of pinion sleeve 40.

What is claimed is:

1. A governor-drum drive comprising a rotatable governor-drum shaft, a sleeve journaled on said shaft, drive means for rotating the sleeve, a cage journaled on the sleeve, a pair of interlocked planetary gears journaled on a common shaft carried by said cage, a gear in driven relationship with the sleeve and in driving relationship with one of the said planetary gears, a gear in driving relationship with said drum shaft and in driven relationship with the other planetary gear, and means to rotate

the cage for altering the normal rotational speed imparted to the drum shaft by the said drive means.

2. A governor-drum comprising, in combination, a rotatable governor-drum shaft, a pinion sleeve journaled on said shaft, a gear secured to, carried by and in driving relationship with the drum shaft, a control gear journaled on the pinion sleeve, a pair of interlocked planetary gears journaled on a common shaft secured to and carried by the control gear for disposing one of the planet gears in driven relationship with the pinion of the pinion sleeve and for disposing the other planetary gear in driving relationship with the drum shaft drive gear, means for rotating the pinion sleeve, and means for rotating the control gear to alter the normal rotational speed imparted to the drum shaft by rotation of the pinion sleeve.

3. The combination of claim 2, wherein the pitch diameter of the pinion and the planetary gears are the same, but wherein the number of teeth in the pinion is less than the number of teeth in the planetary gear which it drives, and wherein the number of teeth of the other planetary gear is less than the number of teeth of the first mentioned planetary gear.

4. The combination of claim 2, wherein the pitch diameter of the pinion of the pinion sleeve and the two planetary gears are the same, but wherein the number of teeth in the pinion is less than the number of teeth of the planetary gear driven thereby, and wherein the number of teeth of the other planetary gear is less than the number of teeth of the first planetary gear and greater than the number of teeth of the pinion.

5. The combination of claim 2, wherein the pitch diameter of the drum shaft gear, pinion and the two planetary gears is the same, but wherein the number of teeth in the pinion is less than the number of teeth of the planetary gear driven thereby, wherein the number of teeth of the other planetary gear is the same as the number of teeth of the drum shaft gear driven thereby, and wherein the last mentioned number of teeth is less than the number of teeth of the first planetary gear and greater than the number of teeth of the pinion.

6. The combination of claim 2, wherein a cage is secured to and carried by the control gear, said cage housing the planetary gears and that portion of the drum shaft between its end and the means for rotating the pinion sleeve.

7. The combination of claim 2, wherein a cage including cylindrical side walls and an end wall is secured to and carried by the control gear for housing the planetary gears, drum shaft gear and the end of the drum shaft, and means to journal the end wall of the cage on the end of the drum shaft.

8. The combination of claim 2, wherein the means for rotating the control gear includes a speed reducer, and wherein the said speed reducer and the means for rotating the pinion sleeve are powered from a common drive means.

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