

[54] **DRIVING DEVICE FOR INTERMITTENTLY REVOLVING FEEDING CYLINDER IN PRINTING AND PAPER PROCESSING MACHINES**

[75] Inventors: **Artur Blüttner**, Heidelberg; **Hugo Rambausek**, Wiesloch, both of Germany

[73] Assignee: **Heidelberger Druckmaschinen Aktiengesellschaft**, Heidelberg, Germany

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[51] Int. Cl..... **B65h 5/12**

[58] Field of Search 271/53, 270, 273, 274, 271/277, 266; 101/232

[56] **References Cited**

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Primary Examiner—Evon C. Blunk

Assistant Examiner—Bruce H. Stoner, Jr.

Attorney, Agent, or Firm—Herbert L. Lerner

[57] **ABSTRACT**

Drive mechanism for intermittently revolving a sheet feeding cylinder in printing and paper processing machines having a single revolution cylinder includes an elongated journal pin for the single revolution cylinder, two cam discs mounted on the elongated journal pin and adapted to control acceleration, delay and stoppage phases of the feeding cylinder, an elongated shaft for the feeding cylinder, a roller support member firmly connected to the feeding cylinder shaft, two rollers journaled on the roller support member, the rollers being in form-locking rolling engagement with the cam discs during the phases of the feeding cylinder, toothed segment means for effecting accurate coincidence of further rotation of the feeding cylinder with that of the single revolution cylinder, the toothed segment means being intermittently meshingly engageable with a gear secured to the elongated shaft of the feeding cylinder.

1 Claim, 7 Drawing Figures

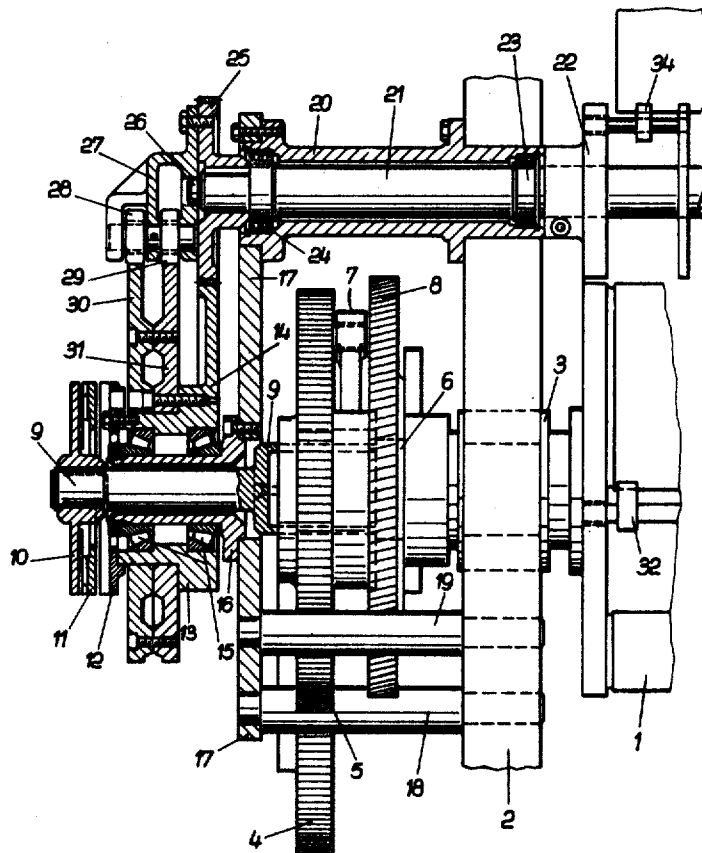


Fig. 1

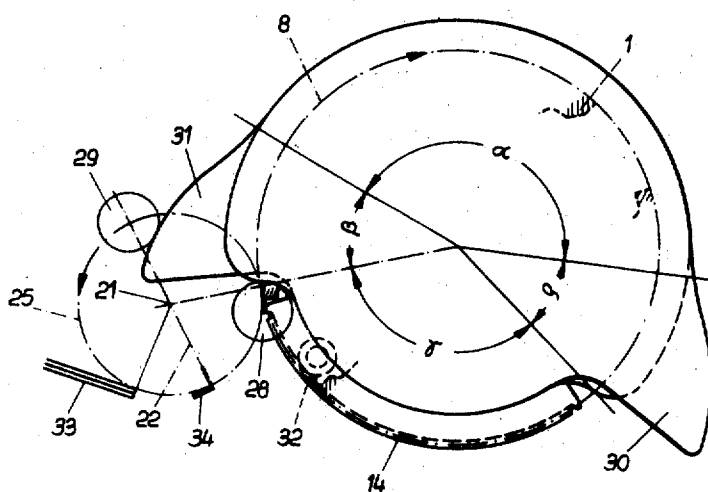
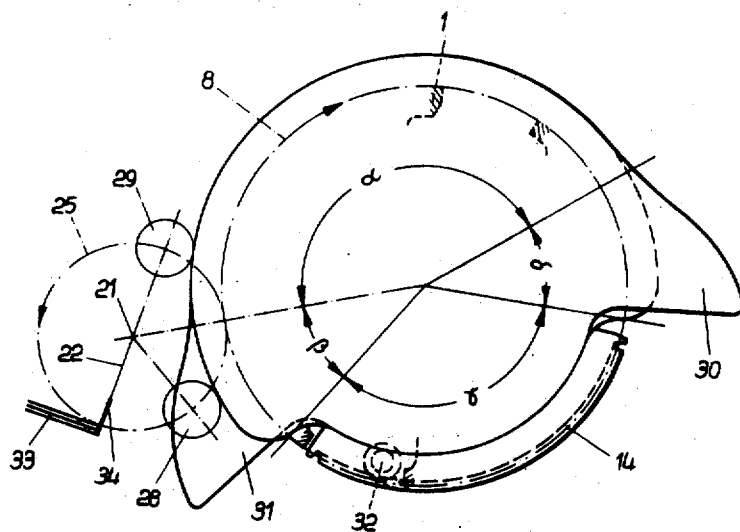


Fig. 2

Fig. 3

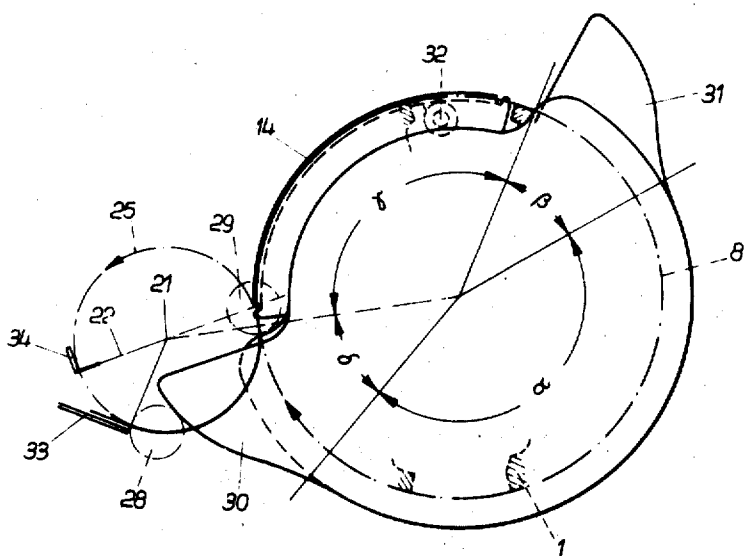
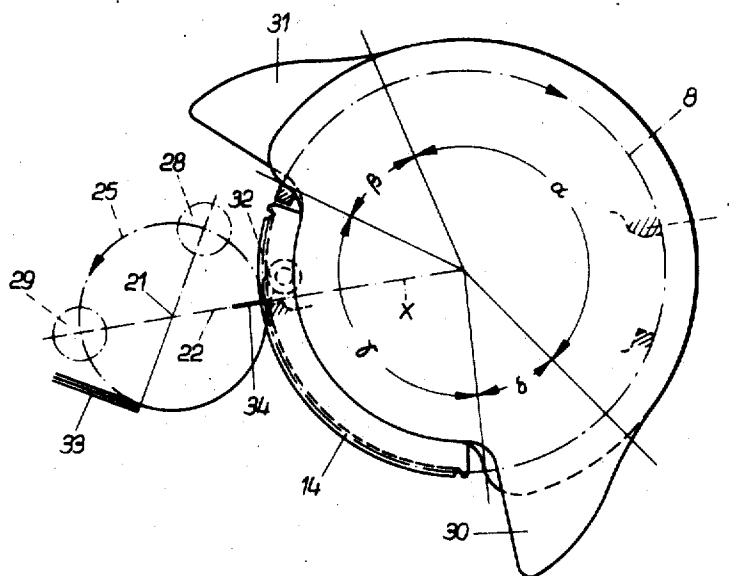


Fig. 4

Fig. 5

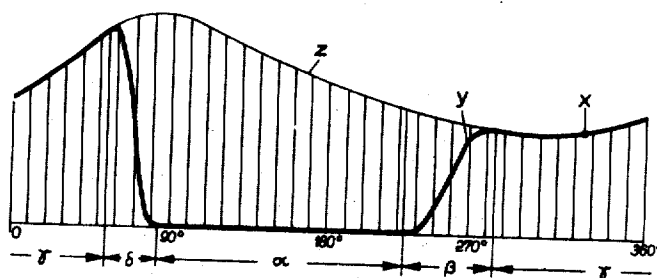
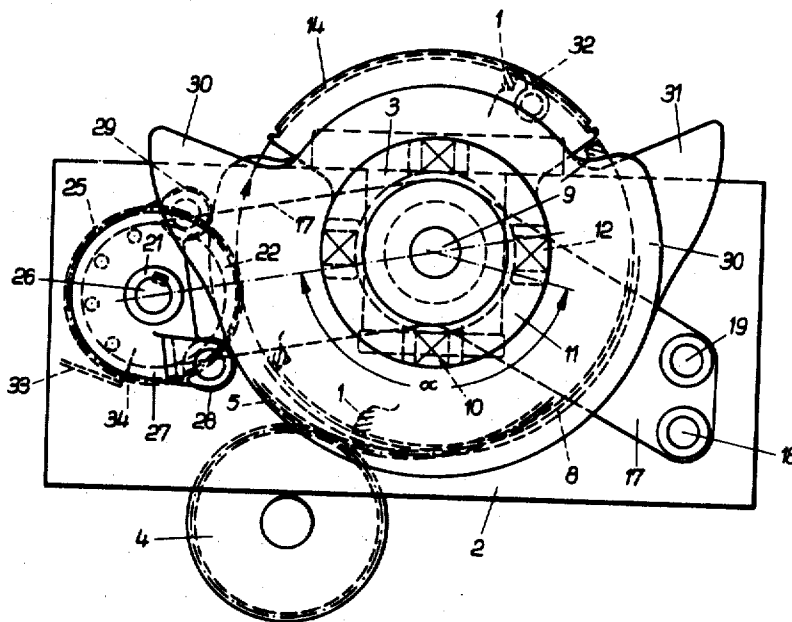


Fig. 7

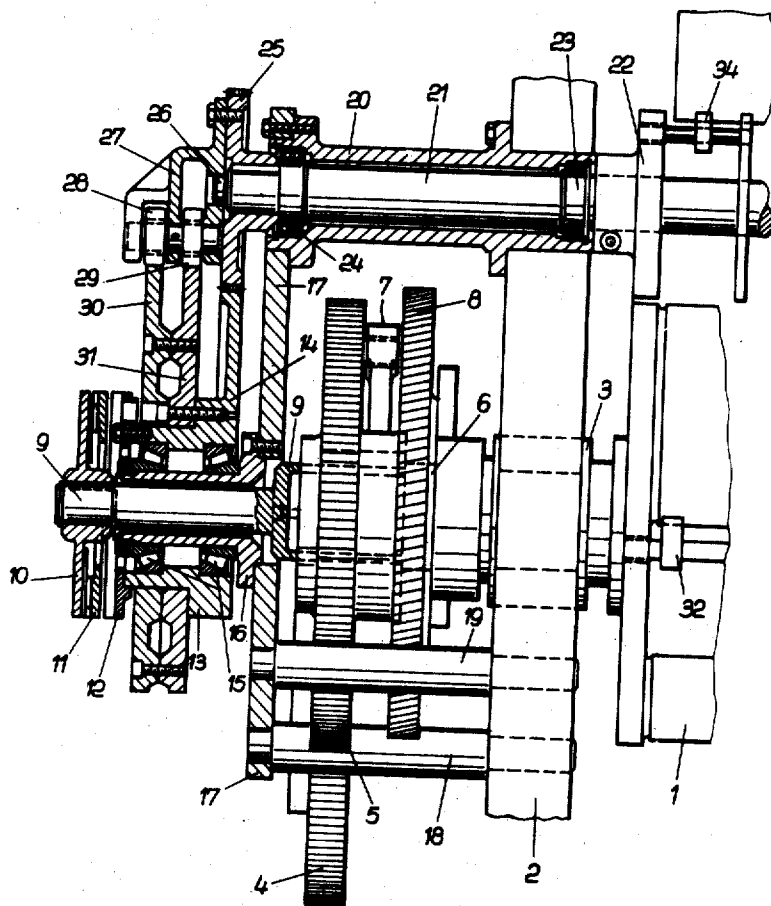


Fig. 6

DRIVING DEVICE FOR INTERMITTENTLY REVOLVING FEEDING CYLINDER IN PRINTING AND PAPER PROCESSING MACHINES

The invention relates to a driving device or drive mechanism for intermittently revolving sheet feeding cylinders in printing presses and paper processing machines wherein the acceleration and delay phases are produced by cam and roller devices.

Maltese cross transmissions for driving sheet feeding devices have been known heretofore from German Pat. No. 1,033,224, wherein the feeding cylinder remains at rest during the feeding and the alignment or orienting of the sheet on the feed table. After the aligned sheet has been gripped, the feeding cylinder must be accelerated and, even before the sheet transfer to the impression cylinder or a subsequent cylinder, must attain the precise velocity of the impression cylinder. After the unwinding of the transferred sheet, there follows the delay phase which leads to the stoppage of the feeding cylinder. Such maltese cross transmissions are difficult to manufacture and are expensive because of the number of transmission parts that are required.

Another heretofore known transmission for driving sheet feeding devices operates by means of elliptic gears in connection with roller and cam controls. A direct sheet feed to the sheet feeding cylinder is not possible with such driving devices because the stoppage interval is too short. Revolving grippers are brought to a standstill only for a moment in order to grip the sheet. The sheet feed proper to the feeding marks occurs on the feed table. These heretofore known transmissions are complex and costly and do not provide the desired simplicity (German Pat. DRP No. 627,332).

In a further heretofore known transmission for sheet introducing cylinders, cam and roller devices have become known that carry out the rotation with varying velocities. The slower period serves for gripping the aligned or oriented sheet by the feed table. The sheet introducing cylinder does not reach a standstill, and consequently all of the difficulties of a separated or divided sheet feed are produced. Also, the transmission parts are very expensive and thereby raise the cost (German Pat. DBP No. 1,034,656).

It is accordingly an object of the invention to provide a driving device of the aforementioned type with relatively simple transmission means which attains an adequately long stoppage or standstill period of the sheet feeding cylinder for gripping in matching alignment a sheet fed to the feed table, as well as for driving the feeding cylinder in a specific turning range so that the sheet that is received is transferred exactly with the peripheral velocity of the succeeding cylinder to the gripper of the latter.

With the foregoing and other objects in view, there is provided, in accordance with the invention, a drive mechanism for intermittently revolving a sheet feeding cylinder in printing and paper processing machines having a single revolution cylinder comprising an elongated journal pin for the single revolution cylinder, two cam discs mounted on the elongated journal pin and adapted to control acceleration, delay and stoppage phases of the feeding cylinder, an elongated shaft for the feeding cylinder, a roller support member firmly connected to the feeding cylinder shaft, two rollers journaled on the roller support member, the rollers being in form-locking rolling engagement with the cam

discs during the phases of the feeding cylinder, toothed segment means for effecting accurate coincidence of further rotation of the feeding cylinder with that of the single revolution cylinder, the toothed segment means being intermittently meshingly engageable with a gear secured to the elongated shaft of the feeding cylinder.

The drive mechanism of the invention of the instant application is suited for an intermittently revolving sheet feeding cylinder, to permit a stoppage or standstill period at the feed table that is of such length that the feed marks and grippers can be located directly in the feeding cylinder, the sheet feed and alignment or orientation can take place directly during this standstill. A single revolution cylinder for cylinder printing presses or stamping machines are therefore especially well suited for use with the drive mechanism of the invention of the instant application because the feeding cylinder, which is considerably smaller in diameter than is the impression cylinder, affords a standstill or stoppage period that is of adequate length.

The transmission parts remain unchanged whether the use occurs with a uniformly revolving single revolution cylinder or, as in the embodiment described hereinafter, with an impression cylinder that rotates in fact, continuously in one direction although with varying angular velocity.

The simplicity of the transmission resides in the fact that all of the transmission parts which produce the motion phases are disposed on the shaft of the single revolution cylinder, and all of the transmission parts for the intermittently occurring rotation of the feeding cylinder are located on the shaft of the feeding cylinder. The transmission parts are sturdy, simple and inexpensive to produce, and are precise in their function.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in driving device for intermittently revolving feeding cylinder in printing and paper processing machines, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a schematic view of the sheet feeding cylinder drive at the instant of the stopped position of the feeding cylinder after it has turned through an angle α and at the beginning of the rotation through the acceleration stretch β of the single revolution cylinder;

FIG. 2 is a schematic view of the feeding cylinder in an operating position at the moment at which the further rotation of the feeding cylinder through the stretch of the angle γ occurs due to a meshing toothed segment on the shaft of the single revolution cylinder;

FIG. 3 is a view of the transmission members of FIGS. 1 and 2 at the instant of sheet transfer at the point x from the feeding cylinder to the grippers of the single revolution cylinder;

FIG. 4 is another view of the feeding cylinder in a further phase thereof i.e. at the beginning of the delay phase over the distance of the angle δ and the end of

the rotation of the feeding cylinder by the toothed segment;

FIG. 5 is a partial side view of the transmission members of FIGS. 1 to 5 at the beginning of the stoppage of the feeding cylinder through the stretch α at the feed table;

FIG. 6 is an enlarged partial cross-sectional view of the transmission members of FIGS. 1 to 5; and

FIG. 7 is a velocity-time curve z of the impression cylinder continuously revolving with varying angular velocity and the associated velocity-time curve y of the feed cylinder during an operating period of 360° .

Referring to the drawing and first, particularly, to FIGS. 5 and 6 thereof, there are shown therein a single revolution cylinder 1 of a cylindrical printing press or cylindrical stamping machine, and, in fact, in the case at hand, acting as an impression cylinder that runs continuously in the direction indicated by the broken arrow in FIG. 5 i.e. clockwise. The single revolution cylinder 1 is mounted on both sides thereof in bearings in a conventional manner. A side wall 2 with a bearing 3 represents the bearing location at the drive side of the printing press or stamping machine.

The single revolution cylinder 1 revolves in a conventional manner by meshing of the steadily revolving gear 4 with a gear 5, the latter being mounted in bearings in a conventional manner eccentrically to the cylinder pin or journal 6. By means of a driver rod 7, which is articulately connected to the gear 5 and to a gear 8 secured to the impression cylinder 1, the uniform or steady revolution of the gear 5 is transmitted to the gear 8 and transformed into a rotation with varying angular velocity therein. The gear 8 is threadedly connected firmly to the cylinder pin or journal 6.

A flange bolt 9 is threadedly secured to an end of the cylinder journal pin 6 and carries a cross plate 10 at the outer end thereof. The cross plate 10 has a middle portion 11 that is crosswise provided with entrainers, and the middle portion 11 transmits the rotation to a part 12 of the cross plate 10. The coupling 10, 11, 12 may be an "Oldham" type flexible coupling which has been well known by the art for many years, as disclosed in KENT'S MECHANICAL ENGINEERS' HANDBOOK, 1938, John Wiley & Sons, Inc., Page 24-59, and the book MECHANISM, 1955 by J. S. Beggs, McGraw Hill Book Company, Inc., Page 145. The part 12 is threadedly secured to the bearing hub 13 of the toothed segment 14, which is mounted in roller bearings 15 on a flange bushing 16 which is screwed to a bearing shield or plate 17. The latter is carried at one end thereof by retaining pins 18 and 19, that are press-fitted into the side wall 2, as well as threadedly secured at the other end of the bearing shield 17 to a flange bushing 20. The elongated shaft 21 of a feeding cylinder 22 is mounted by means of roller bearings 23 and 24 on the drive side. The shaft 21 is firmly connected at an end thereof to a gear 25.

A support member 27, which is firmly screwed to the gear 25, is centered on the pin end 26 of the shaft 21. Rollers 28 and 29 that are journaled in the support member 27 are in continuous form-locking engagement with two cam discs 30 and 31 that are firmly screwed in common to the toothed segment 14.

Since the single revolution cylinder 1 acting as an impression cylinder is raised about 1.5 mm when the printing or stamping has stopped, the revolution of the single revolution cylinder 1 must be directed through

the cross plate group 10, 11, 12, because the toothed segment 14 must always be firmly mounted with the cam discs 30 and 31. Therefore, the flange bushing 16 has a bore that is larger in inner diameter than the outer diameter of the flange bolt 9 extending therethrough. When employing the gearing or transmission for a printing press or stamping machine having a cylinder that need not carry out any raising or lowering movement, these parts are dispensed with, the roller bearings 15 being directly attached to the elongated cylinder journal pin 6.

To supplement the disclosure, a cylinder gripper 32 in the single revolution cylinder 1 is shown in FIGS. 1 to 5. The disposition of the sheet feed table 33 and a feed cylinder gripper 34 with feed marks of the feeding cylinder 22 is apparent from FIGS. 1 to 6.

With respect to the plot diagram of FIG. 7, it is noted that the varying rotary speed of the impression cylinder 1 is represented by the curve z . The transfer point of the sheet from the grippers 34 of the feeding cylinder 22 to the grippers 32 in the single revolution cylinder 1 is indicated at x . It is advantageous that the single revolution cylinder 1 at this instant have its lowest rotary speed.

The courses of movement of the feeding cylinder 22 are shown in the plot diagram of FIG. 7 by the darkly drawn curve y . It is apparent therefrom that the stretch α during which the feeding cylinder 22 is stopped is followed by the acceleration stretch β . Thereafter, further revolving of the feeding cylinder 22 is instituted from the single revolution cylinder 1 through the toothed segment 14 and lasts over the stretch γ . The delay stretch δ , which ends with the stoppage of the feeding cylinder 22 anew, completes the operating period of 360° .

The transmission of the invention operates as follows:

The revolution of the uniformly or non-uniformly revolving single revolution cylinder 1 in a conventional manner is transmitted through the cross plate group 10, 11, 12 to the drive means 14, 30, 31. The rollers 28 and 29 of the roller support members 27, that are firmly connected to the shaft 21 through the gear 25, travel form-lockingly on the cam discs 30 and 31 and transmit the varying motion cycle of the cam discs 30 and 31 and the toothed segment 14 to the feeding cylinder 22.

We claim:

1. Drive means for a printing and paper processing machine of the type having an intermittently revolving sheet feeding cylinder and a single revolution cylinder comprising a flange bushing, an elongated journal pin for the single revolution cylinder, an extension of said journal pin mounted for radial movement of its axis inside said flange bushing, two cam discs mounted on said flange bushing and adapted to control acceleration, delay and stoppage phases of the feeding cylinder, an elongated shaft for the feeding cylinder, a roller support member firmly connected to said feeding cylinder shaft, two rollers journaled on said roller support member, said rollers being in form-locking rolling engagement with said cam discs during said phases of the feeding cylinder, toothed segment means for effecting accurate coincidence of further rotation of the feeding cylinder with that of the single revolution cylinder, said toothed segment means being intermittently meshingly engageable with a gear secured to said elongated shaft of the feeding cylinder, said sheet feeding cylinder and said toothed segment means being rotatably mounted

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on the frame of said machine, said cam discs and said toothed segment means being separated from said journal pin extension and mounted on said flange bushing connected to the machine frame, and coupling means connected to said journal pin extension for transmitting 5

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rotation of said single revolution cylinder to said cam discs and said toothed segment means, said coupling means being adapted to accommodate said radial movement of said journal pin extension.
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