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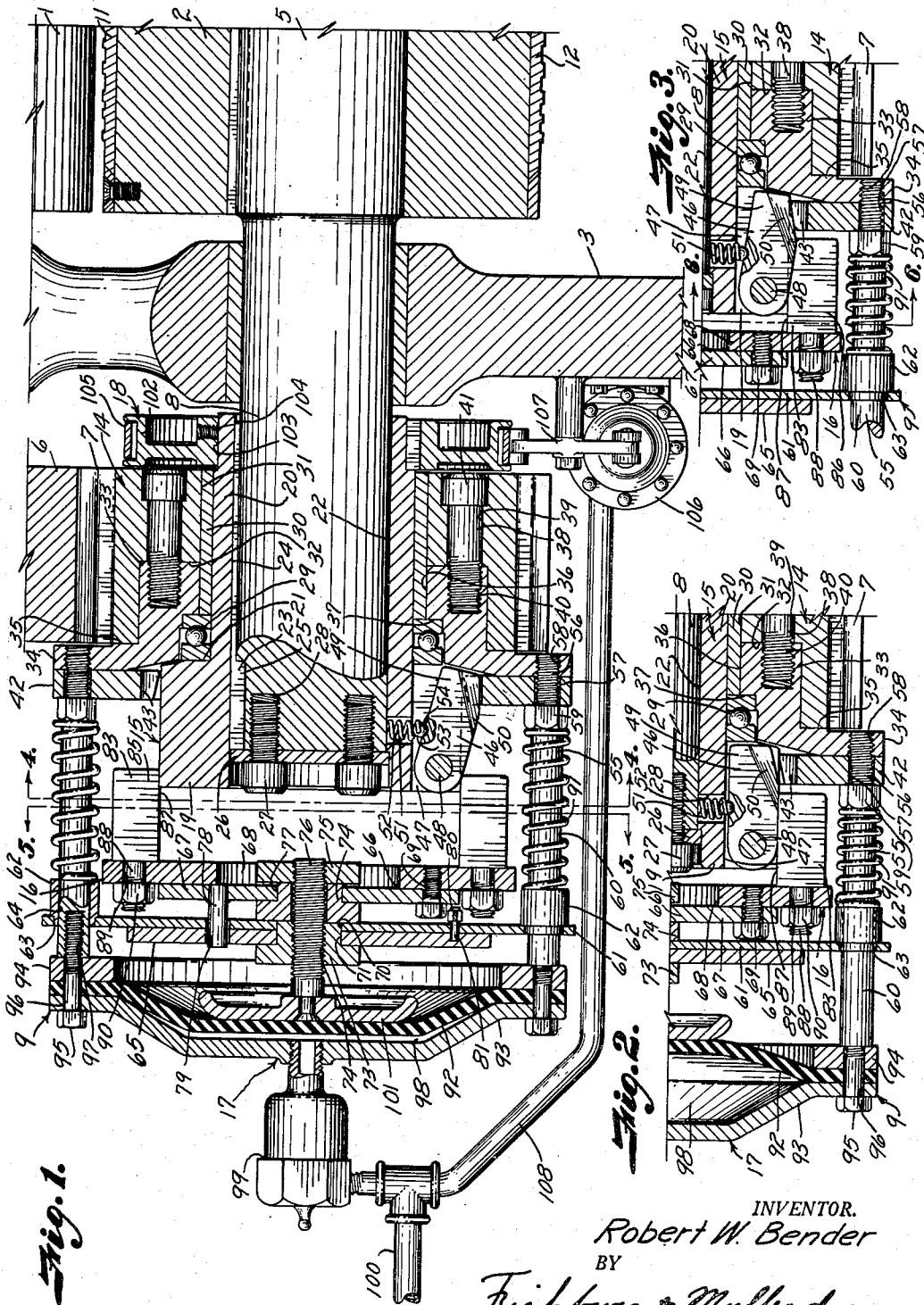
R. W. BENDER

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INDEXING APPARATUS FOR PRINTING PRESSES

Filed Feb. 23, 1951

2 Sheets-Sheet 1



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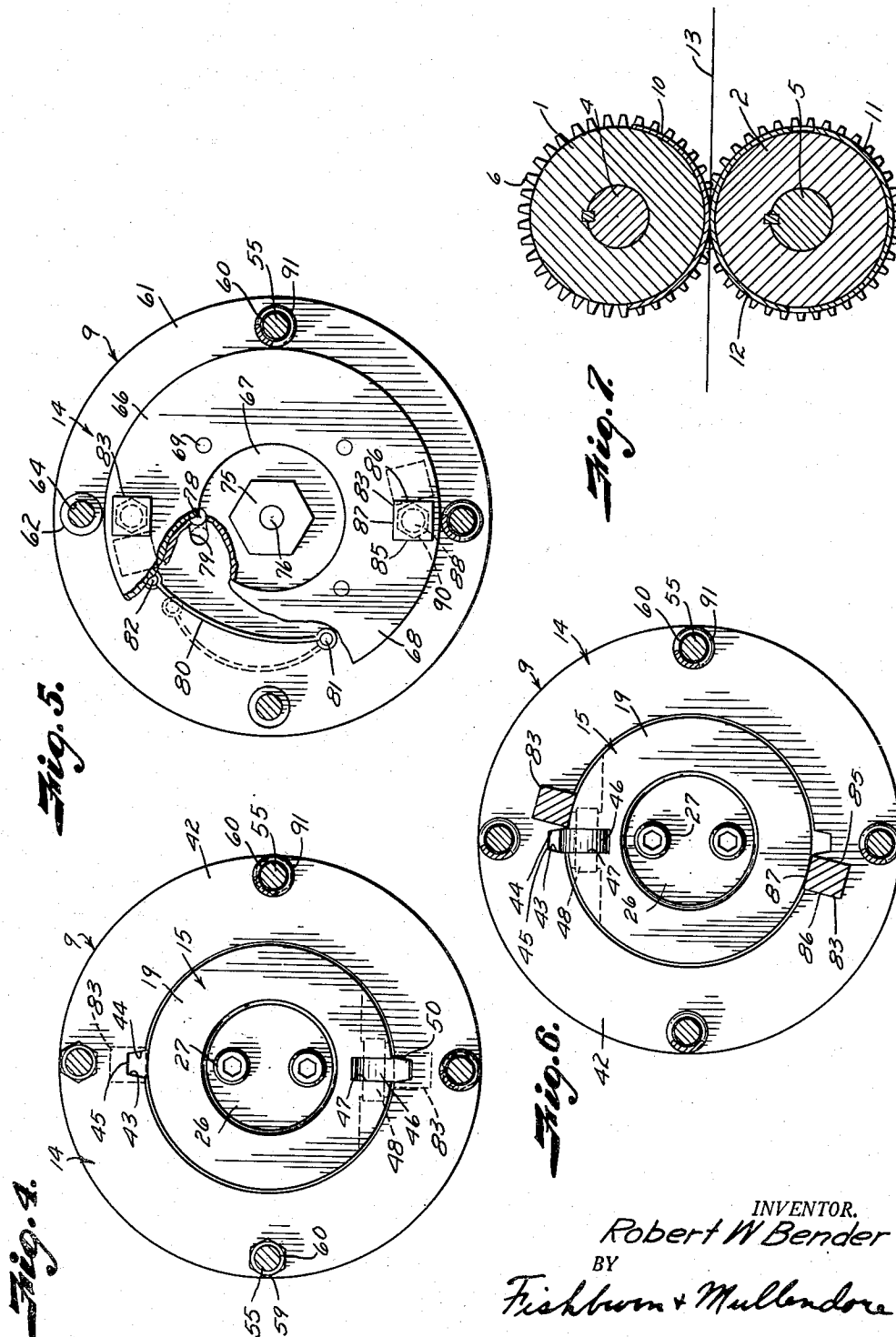
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2 Sheets-Sheet 2



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INDEXING APPARATUS FOR PRINTING PRESSES

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3 Claims. (Cl. 101-248)

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This invention relates to an indexing apparatus for selectively and automatically rendering any one of a plurality of imprinting means effective in a printing press while the press is in operation. For example, the subject matter of a circular, catalog or the like, is suitable for the use of many merchants handling the class of goods described therein. Consequently, such catalogs or the like may be economically printed in mass quantities on high speed presses. However, it is impractical to stop such presses after each individual merchant's supply has been printed and change the printing set-up to print the name and address or other data that renders the supplies of the catalogs or the like individual to the merchants. It has therefore been the practice in most printing establishments to complete the total run of catalogs or the like after which the quantities required by each merchant are printed with the different names, addresses, and other matter required by the respective merchants. It is obvious that the re-handling of the catalogs materially increases the cost of the printing jobs.

It is therefore the principal object of the present invention to provide such high speed presses with means for printing the individualizing distinguishing matter required by the respective merchants and to selectively render the respective printing set-ups effective without stopping the press when making the change-over after a required number of articles have been printed for any one of the merchants to be supplied.

Other objects of the invention are to provide an indexing apparatus for selecting the desired printing set-up that is of simple construction, positive in operation, and which permits accurate registry and timing with the press; and to provide an indexing apparatus which enables an extremely quick change of the printing set-up without clashing of parts or possibility of damaging the press.

In accomplishing these and other objects of the invention as hereinafter pointed out, I have provided improved structure the preferred form of which is illustrated in the accompanying drawings wherein:

Fig. 1 is a sectional view of a portion of a high speed rotary press and an indexing apparatus constructed and mounted in accordance with the present invention, and showing the clutching elements interengaged to retain one of a plurality of printing set-ups or plates in timed relation with a blanket cylinder of the press.

Fig. 2 is a fragmentary sectional view similar

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to Fig. 1 but showing the clutching elements disengaged as when changing from one printing set-up or plate to another.

Fig. 3 is a similar fragmentary section showing the clutch elements returning to engaged position for retaining the next selected printing set-up or plate in timed relation with the blanket cylinder.

Fig. 4 is a cross section on the line 4-4 of Fig. 1, the section being shown of slightly smaller scale than the section of Fig. 1.

Fig. 5 is a similar cross section on the line 5-5 of Fig. 1.

Fig. 6 is a section taken at the point indicated by the line 6-6 of Fig. 3.

Fig. 7 is a cross section through the printing set-up and blanketing cylinder of the press.

Referring more in detail to the drawings:

1 and 2 designate respectively the blanket and printing cylinders for printing special material on a paper web being run in a conventional high speed rotary press indicated by a side frame member 3 of Fig. 1. The cylinders 1 and 2 are fixed on transverse shafts 4 and 5 (see Figs. 1 and 7) which are suitably journaled in the side frames 3 of the press. Fixed to a projecting end of the blanket cylinder shaft is a pinion gear 6 which meshes with a gear 7 mounted coaxially of the projecting end 8 of the printing cylinder shaft 5 and which is adapted to be connected therewith by clutch means controlled by an indexing mechanism 9. The printing cylinder 2 may be provided with a plurality of printing plates arranged circumferentially thereof and adapted to cooperate individually with a blanket strip 10 located on the circumference of the blanket cylinder 1. For simplicity, the printing cylinder in the illustrated instance is shown as equipped with two printing plates 11 and 12 that are arranged on diametrically opposite sides thereof and each is provided with a different printing set-up to cooperate with the blanket strip 10 of the blanket cylinder to effect printing on the paper web 13 that is being run through the press. It is to be understood that the cylinders 1 and 2 are related to the other printing rolls of the press (not shown) and are operated in timed relation therewith so as to effect printing on the web 13 depending upon which of the plates 11 and 12 is moved into timed relation with the strip 10. For example, in printing the web 13 to make up a catalog, the printing plate 12 may be set to register with the blanket strip and maintain printing relationship therewith until a given number of imprints have been

delivered from the press. The indexing mechanism 9 will then be operated to effect movement of the plate 12 out of printing relation with the strip 10 and the printing plate 11 into printing registry whereby the plate 11 will be effective in printing the subsequent run through the press. The plates 11 and 12 may be of any suitable character and applied to the cylinder 2 in any desired manner; for example, by use of "sticky-back" material that is well known in the printing industry.

The indexing and control mechanism, embodying the features of the present invention, generally includes a driving member 14, a driven member 15, a selecting mechanism 16, an actuator 17, and a brake mechanism 18.

The driven member 15 includes a cylindrical head 19 having a hub portion 20 of smaller diameter to provide an annular shoulder 21. The driven member has an axial bore 22 to receive the projecting end 8 of the shaft 5 when the driven member 15 is mounted thereon and retained in fixed relation therewith by means of a key 23 engaging in registering key grooves 24 and 25 within the driven member 15 and shaft 5 respectively. The driven member 15 is retained on the shaft by a plate 26 that is seated within the outer end of the bore 22 and retained by cap screws 27 that are turned into internally threaded sockets 28 provided in the outer end of the shaft 5, as best shown in Fig. 1. Mounted on the hub portion of the driven member and engaging the annular shoulder 21 is an antifriction bearing 29 which cooperates with a bearing sleeve 30 in journalling the driving member 14 on the driven member 15. The gear 7 has an axial bore 31 to receive the bearing sleeve 30 and a counterbore 32 extending inwardly from the outer side face of the gear to receive therein a hub portion 33 of the driving member 14. The driving member 14 also includes an annular flange 34 that encircles the hub and cooperates therewith in providing an annular shoulder 35 engaging the outer side face of the gear 7. The hub of the driving member also has an axial bore 36 conforming with the axial bore 31 of the gear and a counterbore 37 to accommodate the antifriction thrust bearing 29 as best shown in Fig. 1.

The gear 7 and driving member 14 are interconnected as a unit by cap screws 38 extending through openings 39 in the gear and into threaded sockets 40 in the hub of the driving member, the heads 41 of the screws being preferably inset with the inner side face of the gear 7 to prevent interference with the brake mechanism 18 and permit a more compact structure. Carried on the flange 34 of the driving member is a clutch ring 42 which encircles the cylindrical head 19 of the driving member 14 and has circumferentially spaced notches 43 on the inner circumference thereof which correspond in number with the number of printing plates to be used on the printing cylinder 2 which, in the illustrated instance, are two in number and are therefore diametrically arranged. The notches 43 have tapered side faces 44 converging toward a bottom face 45 to permit free entrance of a clutch element 46 that is carried by the driven member 15 as now to be described.

The clutch element 46 is pivotally mounted within a longitudinal recess 47 that is provided in the periphery of the cylindrical portion of the driven member 15 and is of a length and depth to completely receive the clutch element 46 therein. The clutch element 46 is pivotally mounted within the recess on a transverse pin 48 and has a free

end 49 that is provided with biasly arranged bevel faces 50 on opposite sides thereof to conform with the faces 44 of the notches 43, as best shown in Fig. 4. The clutch element 46 is normally urged into engagement with the tapered inner circumference of the clutch ring 42 so as to effect entrance into one of the notches 43 whenever the clutch element 46 registers therewith, as later described. This is effected by a spring 51 which is seated in a recess 52 of the driven member 15 and presses against a ball 53 that seats in a ball socket 54 on the inner side face of the clutch member 46 as shown in Figs. 1, 2, and 3. The clutch ring is secured to the outer side face of the flange 34 by studs 55 having threaded ends 56 extending through openings 57 in the clutch ring and into internally threaded openings 58 in the flange of the driving member 14. Threadedly mounted on the studs are jam nuts 59 for clamping the clutch ring against the flange of the driving member. The studs 58 include post portions 60 for carrying the selecting mechanism 16 and to mount the actuator mechanism 17. The mechanism 17 includes a disk 61 carrying laterally disposed circumferentially spaced bushings 62 staked or otherwise secured in openings 63 of the disk and which have inner bores 64 to receive the post portions 60 of the studs so that the disk 61 is slidably supported thereby to move in an axial direction to and from the driving and driven members 14 and 15.

The disk 61 may be reinforced by a backing plate 65 to mount a lug carrier 66 which may be formed of rings 67 and 68 suitably connected together by cap screws 69. The disk 61 and plate 65 have registering axial openings 70 and 71 to mount a nut 72 having an internally threaded bore 73. The nut 72 cooperates with a spacer 74 to clamp the backing plate 65 and disk 61 therebetween when a nut 75 is applied on a threaded stud 76 which also mounts the nut 75 and spacer 74. The spacer 74 has an annular recess 77 to freely mount the ring 67 thereon so that the lug carrier may have slight relative rotation with respect to the disk 61 as limited by a pin 78 that projects from the outer face of the ring 67 and engages within a relatively short arcuate slot 79 in the disk 61 and backing plate 65, as shown in Fig. 1. The pin 78 is yieldingly retained at the end of the arcuate slot 79 in the direction of rotation of the driving member by means of a bow spring 80 or like resilient member having one end mounted on a pin 81 carried on the inner face of the disk 61 and the other end mounted on a pin 82 that is carried on the outer face of the ring 67, as best shown in Figs. 1 and 5. Carried by the ring 68 are a plurality of selecting members or lugs 83, there being a lug for each of the notches 43 in the clutch ring 42 of the driving member. The lugs 83 are mounted to move over the periphery of the driven member and have flat side faces 85 and 86 and inner faces 87 snugly contacting the periphery of the driven member. The lugs are mounted by providing the ends thereof with threaded shanks 88 that extend through openings 89 in the ring 68 and are clamped therein by jam nuts 90 as shown in Fig. 1. The lug carrier ring and disk assembly are normally retained in retracted position, shown in Fig. 1, by means of coil springs 91 that are sleeved on the guide post portions 60 and have one of their ends seated on the jam nuts 59 and their opposite ends seated against the bushings 62. The disk and carrier ring are adapted to be shifted axially to carry the lugs 83 into engaging position rel-

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actively to the clutch element 46 by the actuator 17 now to be described.

The actuator 17 may be of any suitable type adapted for remote operation, however, in the illustrated instance, the actuator includes a flexible diaphragm 92 clamped to the inner face of a dish-shaped disk 93 by a ring 94, the clamping action being effected about the periphery of the diaphragm 92 by cap screws 95 that extend through registering openings 96 in the disk 93, diaphragm 92, and ring 94 into internally threaded sockets 97 that are provided in the ends of the guide posts as shown in Fig. 1.

It is obvious that the cap screws 95 also secure the actuator in coaxial relation with the selector mechanism. The dish portion of the disk 93 cooperates with the diaphragm 92 in forming a pressure chamber 98 and into which an actuating fluid is injected through a swivel connector 99 with a supply duct 103 that is connected with a suitable valve mechanism (not shown) but preferably located at the control station of the press.

Carried by the stud 76 and in position to engage the inner face of the diaphragm is a disk-like push plate 101 against which the inner side of the diaphragm bears so that when fluid pressure medium is injected into the pressure chamber, the diaphragm is flexed to effect a movement of the lug carrier toward the driven member so that the lugs are in position to control and be engaged by the clutch element 46 as later described. The brake mechanism 13 may include a drum 102 that is mounted on a reduced extension 103 of the hub portion of the driven member, the drum being fixed thereon by means of suitable set screws 104 as shown in Fig. 1. Extending about the periphery of the drum is a brake band 105 having the ends thereof connected with a pressure cylinder 106 through a suitable toggle mechanism 107 mounted on the side frame of the press, as shown in Fig. 1. The cylinder 106 is supplied with pressure fluid simultaneously with the supply to the diaphragm chamber through a branch pipe 108. It is obvious that the actuator mechanisms may be of other structures and differentially operated from a remote source without departing from the spirit of the invention.

In using the apparatus constructed and assembled as described, the printing plates 11 and 12 are applied to the printing cylinder 2 and the corresponding blanket strip 19 is applied to the cylinder 1. Since two plates are employed, they are located on exactly opposite diametrical sides of the printing cylinder. When the plate 12 is in printing position, the clutch element 46 is engaged with one of the notches in the clutch ring 42 as shown in Fig. 1. With the press in operation the brake 18 is released and the actuator 17 for the lug carrier is in retracted position. During operation of the press, the blanket and printing cylinders are operating in timed and desired registering relation to effect proper printing by means of the plate 12 since the driving and driven members are positively connected by means of the clutch element 46 and the clutch ring 42.

As above stated, the lug carrier is in retracted position but the entire lug carrier is rotating with the driving member to maintain one of the lugs in aligning registry with the clutch element. After a desired number of copies have been printed in the press and it is desired to shift to the plate 11, the control at the control station

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of the press is operated to admit pressure fluid to the diaphragm chamber of the actuator and the brake actuating cylinder 106 to effect contraction of the brake band 105 about the brake drum 102 and cause movement of the lug carrier toward the driving and driven members so that the lug then in alignment with the clutch element 46 raises the clutch element out of engagement with the notch in the clutch ring. The driving member is now free to move in advance of the retarded or driven member during which time the free end of the clutch element is supported by the track of the clutch ring. However, due to the shape of the clutch element a portion 49' thereof projects a sufficient distance from the periphery of the driven member so that it is in position to be engaged by the following lug on the lug carrier and when this engagement is effected, the driving and driven members are rotated in unison. As soon as the lug has engaged the projecting portion of the clutch element, the pin 78 shifts to the opposite end of the arcuate slot 79 to load the spring 80, as illustrated by the dotted lines in Fig. 5. The clutch element 46 is then in registry with and slides, under action of the spring 51, into the notch to provide a positive driving connection between the driving and driven members. The printing cylinder is in proper relation with the blanket cylinder to effect printing by means of the plate 11. With the pressure released from the brake and diaphragm actuators, the coil springs 91 shift the lug carrier to the position shown in Fig. 1. As soon as the lug carrier is in its retracted position, the lugs are clear of the clutch element and the bow spring 86 is effective in shifting the lug carrying ring to its original position, with the lug that is immediately adjacent the clutch element in aligning registry therewith so as to again be in position to lift the clutch element out of engagement as shown in Fig. 2.

From the foregoing, it is obvious that I have provided an indexing mechanism that is of simple and inexpensive construction and which effectively and positively locks the driving and driven members for the printing cylinder in position to maintain the desired relationships of the printing cylinder with the blanket cylinder.

What I claim and desire to secure by Letters Patent is:

1. In an apparatus of the character described, concentrically rotatable driving and driven members, a clutch element pivotally carried by the driven member, a circular track carried by the driving member and having spaced engaging portions for the clutch element, a spring normally urging the clutch element into position for engaging one of said portions to effect a driving connection between said members, a lug carrier axially movable with respect to said members and having connection with the driving member, the lugs located on said lug carrier in corresponding relation with clutch element engaging portions for moving the clutch element out of engagement to effect release of the driving and driven members for advance of the driving member until the clutch element is engaged with the other of said lugs to drive the driven member while the clutch element is re-engaging with the related engaging portion, means for moving the lug carrier into and out of engaging position with said clutch element, said lug carrier having limited rotative movement with respect to the driving member permitting engagement of the clutch element with a clutch element engaging portion during

advance of the driving member, and a spring loaded responsive to said limited movement when said other lug engages the clutch element to bring said engaging lug into registry with the clutch element as the lug carrier is moved out of engaging position with said clutch element.

2. In an apparatus of the character described, concentrically rotatable driving and driven members, a clutch element pivotally carried by the driven member, a circular track carried by the driving member and having spaced engaging portions for the clutch element, a spring normally urging the clutch element into position for engaging one of said portions to effect a driving relation between said members, a lug carrier axially movable with respect to said members and having connection with the driving member, lugs on said lug carrier in corresponding relation with the element engaging portions for moving the clutch element out of engagement in effecting release of the driven member and advance of the driving member until the clutch element is engaged by the following lug to drive the driven member while the clutch element is re-engaged with the related clutch element engaging portion, means for moving the lug carrier into and out of engaging position with said clutch element, a brake connected with the driven member for retarding rotation thereof, an actuator for the brake, means for rendering said actuator effective, said lug carrier having limited rotative movement with respect to the driving member permitting engagement of the clutch element with a clutch element engaging portion during advance of the driving member, and a spring loaded responsive to said limited movement when said lug engages the clutch element to bring said lug into registry with the clutch element as the lug carrier is moved out of engaging position with said clutch element.

3. In a rotary printing apparatus having a blanket cylinder and a plate cylinder with a plurality of printing surfaces, a gear fixed relative to the blanket cylinder for rotation therewith, a driven member fixed relative to the plate cylinder and rotatable therewith, a clutch element pivotally carried by the driven member, a driving member concentrically mounted on the driven member for relative rotation thereon, said driving member having a gear thereon meshing with the gear fixed to the blanket cylinder whereby the driving member is constantly rotated with said blanket cylinder, a clutch element pivotally carried by the driven member for swinging movement radially thereof, a circular track carried

by the driving member and having a plurality of spaced engaging portions for the clutch element corresponding to the respective printing surfaces on the plate cylinder, said circular track and clutch element having corresponding sloping surfaces the engagement of which permits a portion of the clutch element to extend radially beyond the periphery of the driven member, a spring normally urging the clutch element into position for engaging one of the clutch element engaging portions to effect a driving relation between the driving and driven members, a lug carrier axially movable with respect to said members and having connection with the driving member, lugs on said lug carrier in corresponding relation with the clutch element engaging portions and having a clutch element engaging surface substantially engaging the periphery of the driven member for moving the clutch element out of engagement in effecting release of the driven member and advance of the driving member until the clutch element is engaged by the following lug to drive the driven member while the clutch element is reengaged with the related clutch element engaging portion, fluid actuated means for moving the lug carrier into and out of engaging position with said clutch element, a brake connected with the driven member for retarding rotation thereof, an actuator for the brake, means for rendering said actuator effective, said lug carrier having limited rotative movement with respect to the driving member permitting engagement of the clutch element with a clutch element engaging portion during advance of the driving member, and a spring loaded responsive to said limited movement when said lug engages the clutch element to bring said lug into registry with the clutch element as the lug carrier is moved out of engaging position with said clutch element.

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